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# SCIENCE-GOSSIP



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"Well-ordered stones make architecture, well-ordered ideas make logic, well-ordered facts make science."—*Prof. Blackie.*

"The love of novelty is inherent in man, and it is natural for him to go on in acquirement, adding idea to idea, and one species of knowledge to another. It is fortunate there is no locality in which the love of novelty may not be gratified."—*Hugh Miller.*

"To walk with the breeze upon one's brow, to trample the level grass exhuberant with freshness, to climb upon the mountains; to follow through the meadows some thread of water gliding under rushes and water-plants,—I give you my word for it there is happiness in this."—*Gasparin.*

# Our Annual Greeting.

ANOTHER year has passed and another volume is complete—a volume containing many facts and thoughts which could have been ill-spared preservation, and some which will add to the progress of Knowledge. I trust it has given as much pleasure to our readers as to those who have produced and arranged the material from which it is constructed. To the Contributors and Artists, the Editor offers his sincere thanks for the support they have given in what has been to him, as to them, mainly a labour of love; and would take this opportunity of tendering them his congratulations on the good quality of most of their articles. He desires to express his obligations particularly to those who have conducted the departments of Astronomy and Science Abroad, and to others who have furnished valuable series of articles upon special subjects.

JOHN T. CARRINGTON.

1, Northumberland Avenue,
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ROOSTING BUTTERFLIES.

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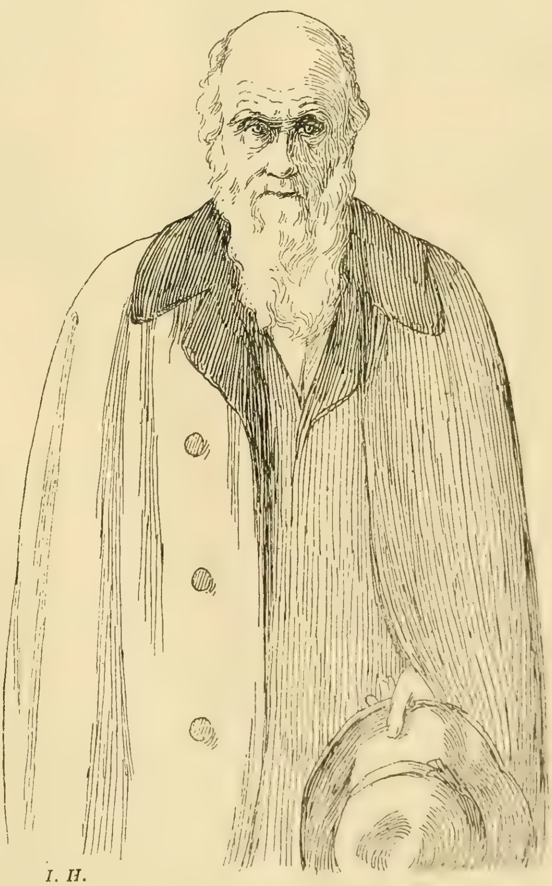
# SCIENCE-GOSSIP.

## SCIENCE AT THE NATIONAL PORTRAIT GALLERY.

By John T. Carrington.

NOW that the collection of pictures of notabilities deemed worthy to represent the foremost people who have made the name of Britain respected throughout the world are gathered together in their new building, we see how small is the representation of Science in the National Portrait Gallery. In all there appear to be no more than thirty representatives out of 1,036 portraits. This may to some extent be accounted for by the fact that until recently these pictures have had no settled home, consequently few people knew whose portraits were there and whose were absent among scientific worthies. It is to be hoped that before the already well-filled walls become more crowded, other and eminent investigators may have their portraits placed where they may be readily seen and venerated. There must be many such which may be, from time to time, available for acquisition, but, of course, these should only be of the very first rank of such men, or at least those whose names have become household words among students of nature in its widest sense. One would think that the Council of the Royal Society would take upon itself the duty of furthering the desirable object, by recommending, when opportunity occurs, any portraits which can be obtained. At present, that which is everyone's business appears to be the especial duty of no one—hence the paucity in the representation of men who have attained to eminence in Science, as compared with Literature, Art, Jurisprudence, Politics, or War.



*I. H.*

Charles Darwin.

We propose to place in review before our readers those portraits which are of especial interest to

them, giving a short sketch of each whom they portray. This will be made more valuable by the addition of sketches from the pictures themselves, by Miss J. Hensman, who has very kindly consented to make them for our pages, and to whom we desire to express our indebtedness.

The first picture which catches our eyes on entering Room XVII. is the replica of a fine portrait painted for the Linnean Society, at Burlington House, of the late

### Charles Robert Darwin, (1809-1882).

This portrait is by the Hon. John Collier, a well-known painter who was personally acquainted with Mr. Darwin, as with many other men of science, having married a daughter of the late Professor Huxley. Mr. Darwin is represented as two-thirds length, about life size, dressed in his out-door costume of a black cloak, holding in his left hand a soft felt hat, just as he was wont to stroll about his beloved garden at Down. This picture was painted in 1883, from studies taken from life.

Nowhere has the heredity of ability of mind shown itself more than in the Darwin family. For four generations at least this ability has taken the form of scientific investigation. In 1644, a William Darwin possessed a small estate at Cleatham, and was a yeoman of the armory at Greenwich to James I. and Charles I. His son William, who was born in 1620, served in the Royalist Army, and afterwards became barrister and Recorder of Lincoln. He married the daughter of Erasmus Earle, serjeant-at-law. A third William Darwin, who was eldest son of the Recorder, married Robert Waring's heiress, with whom came the manor of Elston which is still in the family. There were two sons, William again being the elder, and Robert the younger, who was educated for the bar; he had four sons, the eldest of whom, Robert, born in 1731, appears to have first indicated the taste for natural science which was to found the family distinction in later years. The fourth son was Erasmus, to whom we shall have occasion to refer later in these notes. Erasmus became a noted physician of his generation, an accomplished botanist, and a man of great mental vigour. He had three sons, the eldest, Charles, being educated for the medical profession, was a man of the highest promise, but was unfortunately cut off through a wound whilst dissecting. His youngest brother, Robert Waring, born in 1766, became a leading physician at Shrewsbury, was made a F.R.S. in 1788, and was the father of Charles Robert Darwin, F.R.S., the subject of the portrait under notice. It is hardly good taste to continue this family history to the living members, and it is needless to remind our readers that the two sons of the late Charles Darwin are ranked among our leading scientific men, each having again graced the family by becoming at an early age celebrated in their respective departments of scientific investigation and Fellows of the Royal Society.

The name of Charles Robert Darwin is so fresh in our memories, and his life's work so important and well known, that it would be mere supererogation to here recapitulate it. Suffice it to say that his name will go down to posterity as a philosopher, ranking with Socrates and the greatest thinkers that mankind has ever produced.

Among other portraits of Darwin extant are a water-colour drawing by G. Richmond; two in chalk by Samuel L. Lawrence; a bust (in 1869) by T. Woolner, R.A.; an oil painting by W. Ouless (1875), with replica at Christ College, Cambridge, which was etched by Rayon; oil-painting by W. B. Richmond (1879), also at Cambridge; an etching, by L. Flameng, of Mr. Collier's picture now referred to; a lithograph in the Ipswich British Association Series; a medallion in Westminster Abbey, by Joseph Boehm, R.A., and the fine statue by the same sculptor on the staircase of the Natural History Museum, at South Kensington; there is also a bust of Darwin by Mr. Boehm in the National Portrait Gallery; a plaque by T. Woolner, in Wedgewood ware, is on Darwin's rooms at Christ's College, Cambridge. No portrait, however, of this truly great man can more faithfully depict that beautifully serene expression of one who had attained such profound knowledge, whilst living a life of the greatest simplicity, than that by Collier, in the National Portrait Gallery.

### Michael Faraday (1791-1867).

The portrait of Michael Faraday, which is also in Room No. XVII., is pleasing and doubtless life-like. It is of the head and shoulders of the sitting figure and is about two-thirds life size. This picture was painted, in 1842, by Thomas Phillips, R.A., and represents this great natural philosopher as looking young for his fifty years, with dark brown hair and fresh, healthy complexion. In the same room is a marble bust of Faraday by Sir Thomas Brock, A.R.A., presented, in 1886, by Sir F. Pollock, Bart., and the likeness between that piece of sculpture and the picture is unmistakable.

Michael Faraday was the son of James Faraday, born at Newington Butts, on the Surrey side of the Thames, in London. His father and mother were country folk, of the farming class, from Clapham in Yorkshire, who settled at Newington. They were far from well off in worldly possessions, the husband being a blacksmith. It will be thus better understood that Faraday's genius was

individual as far as his family was concerned, and many are the stories of his shifts and plans to overcome necessity and grasp such education as was attainable in the days of his youth. At one period, about 1800, they were living in Jacob's Well Mews, off Charles Street, Manchester Square. Near by, in Blandford Street, was a small

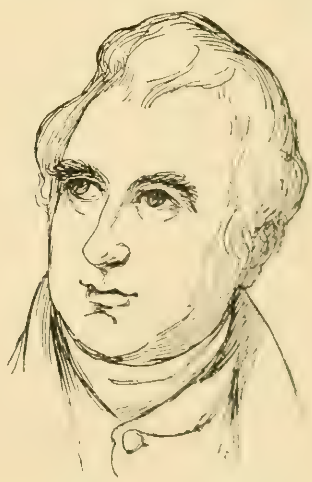
MICHAEL FARADAY.

stationer's and bookbinder's shop, and it was there Michael first started life as an errand-boy. The bookseller was one Riebau, who was so well pleased with the boy that he took him, without premium, at the age of thirteen, as apprentice. This apprenticeship as a bookbinder lasted for eight years. Among his first attractions to the physical studies which eventually passed to the deep learning and originality of thought which characterised him, were some desultory lectures by Mr. Tatum to which he was admitted like others on payment of one shilling. His first step, however, on the path which led to fame was through the gift of tickets from one of Riebau's customers, for the last four lectures delivered by Davy at the Royal Institution, in the spring of 1812. He wrote out these lectures and submitted them to Davy, asking at the same time of Sir Humphrey, his help to get out of his trade to some occupation where he could study science. Davy took a fancy to him and employed him, at twenty-five shillings a week, as an assistant at the Royal Institution. Here we will leave him, for his scientific work is so well known that it requires no recapitulation. He died in a small house, placed at his disposal by H.M. the Queen, on Hampton Court Green, Michael Faraday was of slight stature though well built. He was by habit most active, energetic, and of great facial brightness and animation. A remarkable feature was that his head was so long from front to back that he could not wear ready-made hats. He always wore his naturally curly hair parted down the centre. He was a man of strong emotions, generous, charitable and sympathetic. His relaxation consisted of occasional reading of light literature and frequent visits to theatres. A curious mixture was he of the logical and the thoughtless. He rarely thought of provision for the future, had an absolute trust that the Lord would provide for the morrow, and was a simple believer that he would be equally cared for after he left this sphere. Fortunately he received, much against his own inclination, a Government pension of £300 a year, which, with his plain style of life and few necessities, amply placed him in comfort to the end of his splendid life.

### SIR JOSEPH BANKS, K.B., P.R.S. (1743-1820).

The chief picture at the National Portrait Gallery of Sir Joseph Banks is most pleasing. It represents, in oil colours, by Thomas Phillips, R.A., a fine, stout, elderly gentleman of rubicund features. Dressed in a dark grey, rather loosely made frock coat, he is wearing sash and Order of the Bath. The figure is life-size, in sitting position, cut off above the knees. On his right-hand side is a table with a book and MS. lettered "On the Diseases of Whea—, by Sir Jos. Ban—." His right hand is supported on a walking stick, which passes in front of the lettering of the MS. referred to. His hair is white, and he wears a short collar and white stock with frilled shirt.

Sir Joseph was the only son of William Banks, of Revesby Abbey, in Lincolnshire, but was born in



SIR JOSEPH BANKS, K.B.

Argyle Street, London. His education was carefully tended; first he had a private tutor, then to Harrow School, thence to Eton, when thirteen years old. Up to that period all teaching had been most irksome, and grave fears were felt for his future educational prospects. Suddenly he conceived a passionate fondness for

flowers, and thence to the study of botany. His first book was "Gerard's Herball," which he found in a mutilated condition in his mother's dressing-room. Leaving Eton at eighteen he was entered as a gentleman commoner at Christ Church, Oxford, in 1760. There his botanical studies led him on to other branches of natural history. He applied for and received permission, as there were then not any lecturers on the subject at Oxford, to establish a lecturer on botany. This he did at his own expense; visiting Cambridge for the purpose and bringing back with him Israel Lyons, astronomer and botanist. This he was enabled to do in consequence of the death of his father, which occurred in his first year at college; leaving him ample fortune and the family estate. In consequence of his remarkable attainments in science, Banks was elected a F.R.S., in 1766, at the early age of twenty-two. He commenced to travel in search of plants in the same year, visiting Newfoundland. and staying the winter following in Lisbon. His great friend was Dr. Daniel Solander, who had been a favourite pupil of Linnæus. Sir Joseph Banks' first long expedition was with Captain Cook, in the "Endeavour," which he equipped at his own expense, taking Dr. Solander and two draughtsmen with him. The "Endeavour" sailed from Plymouth in 1768. He had many adventures, including the scientific observation of a transit of Venus, which was part of the object of his voyage, and collected immense quantities of material. This voyage included South America, South Pacific Islands, New Zealand, New Guinea and Java. On the homeward passage, Cape of Good Hope and St. Helena were visited, and England reached on 12th June, 1771. His next voyage was the exploration of Iceland, in 1772, and in 1777 Banks was chosen President of the Royal Society. Then followed some stormy years in the history of the society, the cause being a battle for supremacy between the physicists and what we now call the biologists; for the time being the latter were successful.

In 1781 Banks was created a baronet, the Order of the Bath was conferred upon him, and he became Privy Councillor in 1797. He died from gout at Spring Grove, Isleworth, 19th June, 1820, leaving a widow, but no children. His library and herbarium were left for life to his librarian, Robert Brown, with reversion to the British Museum; but Brown, shortly after the death of Sir Joseph, handed over all the treasures to the Museum. Sir Joseph's artist, Francis Bauer, was provided for for life, to enable him to finish certain drawings and make others of new plants at Kew.

Banks was a munificent patron of Science rather than a worker at detail, and if he ever intended to publish the full results of his collections, he abandoned the idea in 1782, on the death, by apoplexy, of his friend Dr. Solander. He had up to then published comparatively little. His manuscripts are now in the botanical department of the British Museum. He was a man of strong will, considerable energy, and much individuality of character; in fact he was nothing if not autocratic.

### Thomas Bewick (1753-1828).

Of the three Bewicks, wood engravers, Thomas Bewick is best known among naturalists as the artist of the interesting engravings that illustrate his books upon "British Birds," which is his finest work, "British Quadrupeds," and many others. He was born at Cherryburn House on the southern bank of the river Tyne, at Ovingham, Northumberland. It was but a cottage, and his father was John Bewick, small farmer and worker of a little

Thomas Bewick.

colliery for local consumption of coal. Thomas was the eldest of eight children by his father's second wife, and John Bewick the other of the wood engravers of the family was the fifth; there being five daughters and three sons.

Thomas Bewick, who seems to have been a lad full of pranks and innocent mischief, had very little education beyond what was locally available in the village, but he early showed a natural talent for drawing, and a deep love of nature. His first attempts at wood engraving were copies of inn-signs cut with his knife. Among the first of his drawings were some made with blackberry juice. All this ended in his apprenticeship to Ralph Beilby, at Newcastle-on-Tyne, a goldsmith and seal-engraver. Here Thomas Bewick first received instruction in drawing and engraving. Wood-engraving was then in England in a very low condition of art, but it fell to the lot of this youth,

in later years, to revive the art in Britain. Even now Bewick's pictures are admired to the full, and his style frequently copied, although the art is, unfortunately, disappearing before the more rapid and less expensive "process" illustration so generally used. Bewick died on November 8th, 1828, at his house in West Street, Gateshead. In character, Thomas Bewick seems to have been a thoroughly upright, honourable man, unassuming, but very independent and industrious. He brought up his son Robert Elliot Bewick (1788–1849), to his own profession of wood-engraver, in which Robert was most successful. He designed and cut many of the characteristic tail-pieces which adorn the works of Thomas Bewick.

There are several portraits of Thomas Bewick in the neighbourhood of Newcastle-on-Tyne where the family name is deeply cherished. There are two in the National Portrait Gallery, the one sketched here by Miss Hensman being an oil painting by Thomas Sword Good. It was presented to the Gallery in 1894 by the Rev. Albert A. Isaacs, M.A., of Corpus Christi College, Cambridge. In it Bewick is represented about life-size showing hardly more than the head. He appears to have been a man with well defined features, though a little hard and stern-looking. His complexion is depicted as florid, hair black, turning to iron-grey.

*(To be continued.)*

## COMMENSALISM AND SYMBIOSIS.

By James Burton.

It is a matter of common knowledge that frequently, both among plants and animals, a kind of companionship is maintained between two organisms. This is sometimes of advantage to one only of the two parties, but often both profit by the association. The companionship may range from mere accompaniment to that of the most intimate connection. When the two organisms may dwell the one within the other so as to form apparently but one body, the partnership is known as Commensalism or Symbiosis, the former term being used generally for the connections of the less intimate kind, while the latter is restricted to those cases where the organisms have a closer union. It is at the same time true that no sharp line can be drawn dividing the one form from the other, as all intermediate states exist. Commensalism (which means having the same table) is well illustrated in its less intimate form by the *Echeneis* or sucking-fish, which accompanies other fish, sharks especially, no doubt profiting by the unconsidered trifles it picks up from the meals of its voracious messmate. It is able by means of a sucker on the top of its head to fix itself to the body of its friend, and thus gets conveyed from place to place without the expenditure of any exertion. Some sea anemones seem particularly inclined towards commensalism; they are often found attached to the shells forming the homes of hermit crabs and even on the carapaces or claws of crabs, to an extent masking the animals on which they are fixed, and gaining in return a change of situation advantageous in the requirement of food. They also themselves occasionally become the homes of tiny fishes which dwell within the cavity of their body. Some species of *Holothuria* (sea slugs), and a small fish, the *Fierasfer*, live in amicable and close companionship; the latter inhabiting the interior of the former, but passing in and out as it finds requisite. A crab, *Pinnotheres pisum*, is frequently found inside the shells of various bivalves, among others the mussel, where it obtains shelter and apparently does its host no harm, though probably scarcely paying for its accommodation in the way believed by the ancients, who asserted that it warned its friend of coming danger by a gentle nip, and so got the valves closed in time to ensure mutual safety.

Some of the most interesting and typical cases, complete in all details, are to be found in Mr. Thomas Belt's "The Naturalist in Nicaragua." If space permitted I should like to reproduce some of his observations, but they are too extensive. Anyone caring for natural history matters could not do better than procure this work. To take one instance—the trunk and branches of a species of acacia bear numerous pairs of strong curved spines, shaped something like a bull's horns. These, when first produced, are soft and filled with a sweetish pulpy substance, which is soon eaten away by a small ant (*Pseudomyrma*), which makes a hole near the end of the spine and, after emptying it, dwells inside. "Here they rear their young, and in the wet season every one of the thorns is tenanted, and hundreds of ants are to be seen running about, especially over the young leaves." If the plant is shaken or a leaf injured the ants swarm out from their homes and attack the aggressor, and are able to bite and sting severely. They thus form an efficient protection for the plant both against browsing mammals and also against the leaf-cutter ants, which are terrible foes to vegetation in general in that region. In return, the ants are not only supplied with houses and partial food by the acacia as described, but in addition certain glands situated on the leaves,

secrete a honey-like fluid greatly enjoyed by them, and solid food is also provided in the shape of small "fruit-like bodies" found on the leaflets when they first unfold; these ripen at intervals and are then most acceptable to the ants, which continually run about the young leaves seeking for fruits in a suitable condition, and thus prevent injury, at the most critical time, from the depredations of other creatures. This species of ant seems adapted for this particular tree and is not found anywhere else. Moreover, when Mr. Belt sowed some of the acacia seeds in his own garden in another part of the country, where the *Pseudomyrma* did not exist, the seedlings at once fell a prey to the leaf-cutter ants, while in their native district they were protected by their own insect companions. There seems reason to believe the spines are not fully developed in cases in which the ants do not tenant them, so that an actual modification of the plant in the insects' favour is brought about in the majority of instances. Such a close relationship and mutual dependence as is here implied, of obvious benefit to both parties, is very remarkable, especially when existing between a plant and an animal so self-reliant and free as an ant. It almost amounts indeed to symbiosis, and may well be taken as leading us to a consideration of that condition.

Symbiosis means "having the same life," and in the connections described by the term, the organisms usually are actually connected by more or less complete bodily union, sometimes even to the extent of appearing as one to a careful observer. The examples of this condition are most of them of interest to microscopists, and it is in that connection especially I should like to treat them, particularly as many may be studied without trouble or difficulty by the "home naturalist." The various small marine animals now known as Radiolarians (formerly Polycystina), and some of the Foraminifera also, have embedded in the jelly-like substance of their bodies certain yellowish cells or granules; these, after having all sorts of theoretical functions assigned to them, are now almost universally believed to consist of true algæ, living symbiotically in the "sarcode" of the animal. They, in most cases, have a cellulose wall, nucleus, with colouring matter at least resembling the chlorophyll of the higher green plants, and appear like them to be able to excrete oxygen and form starch under the influence of light. It is conceivable that they use the carbon of their hosts as the basis for the starch production, as well as that contained in the water. It is quite probable that the oxygen they give off and some surplus portion of the starch are available for the use of their living homes in return for the protective shelter afforded them.

It is not necessary to go so far for examples of what at least may be similar cases. Every microscopist is acquainted with specimens of pond life of a colour identical with the algæ that are their neighbours. *Hydra viridis* referred to in SCIENCE-GOSSIP (Vol. ii., N.S., p. 276), various species of *Stentor*, *Coleps*, *Paramecium*, and others, are of this tint. It has been asserted that owing to the presence of symbiotic algæ in their body-walls, and in consequence of the presence of the plants, the animals are able to flourish with a greatly reduced food-supply, or even to bear its entire cessation for a time that would be fatal but for the assistance afforded by their indwelling companions, who procure it as already described in the case of the Radiolarians. It is true this theory is by no means so freely accepted as in the previous instance. If, as some of those even who oppose it in its entirety admit, the green colour is due to the presence of chlorophyll corpuscles, though not of actual algæ, it certainly looks like the correct explanation, for chlorophyll is undoubtedly the most typical and characteristic distinction between plants and animals, physiologically considered.

Strasburger, in his "Handbook of Practical Botany," gives an interesting instance which has the advantage of being easily observed by most microscopists. There is a small floating plant called *Azolla;* it is one of the Rhizocarps, a group of the vascular Cryptogams, and is closely allied to the ferns. It looks like a small fern frond and is from half to three-quarters of an inch in length. It consists of a stem with bright green pinnate leaves on each side, which float on the surface of water, having underneath membranous lobes immersed. The upper lobes are swollen or inflated, and have a cavity or hollow inside which communicates with the water through an opening on the inner side of the leaf, and growing from the walls into the cavity are long hairs, in some species at any rate. In the cavities in the leaflets of the living *Azolla* dwells another plant, one of the lower Algæ, named *Anabæna;* it belongs to the Nostocaceæ and consists of rows of small bead-like cells, bluish green; at intervals a larger cell slightly differing in colour occurs, which is called a heterocyst; I believe the purpose of these is not known, but probably they have some connection with reproduction. The leaflets containing the *Anabæna* may be pulled to pieces with needles on a slip in a drop of water, then on putting on a cover glass and pressing slightly, the little algæ can easily be seen. A half-inch objective with B eyepiece, say about 110 to 130 diameters, is sufficient, though a considerably higher power is better. Horizontal sections may be cut by laying the *Azolla* on a piece of cork or even on the finger, and making cuts from base to apex with a razor. Some are almost sure to show the chambers opened by the razor, and the *Anabæna* inside. The slices mount nicely in glycerine or glycerine jelly, if the usual precautions

are taken to prevent too rapid plasmolysis. I have some under the microscope by me now which have been mounted about eight years. It is not easy to see what advantage the *Azolla* gains by this companionship, though there may be some; but it is certain the alga obtains protective security, and may not improbably utilise some waste product from its host. It is true very similar species, if not identical ones, are plentiful enough without any protecting plant. Their colour shows they are able to fix the carbon dioxide found in the water for themselves, and are thus fitted for an independent life. The *Azolla* is commonly grown with other aquatic plants in tanks in warm greenhouses, and requires a higher temperature than our open air in order to flourish, but it will live very well floating on an aquarium at ordinary dwelling-room heat during several months in the summer. I have on one or two occasions obtained it from botanic gardens, and no doubt anyone sufficiently interested might get it that way on application to the proper authority. I have also obtained it in the summer from Mr. R. Green, Central Avenue, Covent Garden Market, London, who supplies various aquarium requisites, and probably would be able to forward specimens by post if desired.

Many cases are known where a *Nostoc*, or closely related alga, takes advantage of cavities in other plants to enter and dwell there; they may be found in some of the Hepaticæ and in the cells of *Sphagnum*, also in the large empty cells forming the velamen of the aerial roots of some epiphytic orchids. As in these cases, it is probable the tenant obtains no other advantage than that of a comparatively secure resting-place, while the host is not benefited by its presence, it might be more appropriate to consider these as commensalism only.

The most perfect instance of symbiosis, however, is one with which, from its commonness, all are more or less acquainted, and which may be investigated without difficulty by anyone possessing a microscope. It is now generally accepted that lichens are composed of two distinct organisms, one an alga, the other a fungus. They live together in companionship, each helping the other to fight the battle of life. With their united capacities they are able to occupy and flourish in situations which neither could hold alone, places in which no other plant could contrive to exist. The alga is always one of the lower members of the class, mostly unicellular, occasionally filamentous. It has been found possible, in some instances, to isolate the alga from its fungal companion and to cultivate it as a normal independent plant. The fungus is usually one of the Ascomycetes, though occasionally another kind, but the attempt to grow them without the alga has not succeeded.

The satisfactory demonstration of lichen structure is not very easy, partly because of the small size of the elements and partly because the fungus hyphæ are with difficulty wetted, so that even with a thin section the tissues are apt to be filled with air, which obscures the view. A fairly successful method is as follows: trunks of trees, somewhat damp walls, palings, etc., are often covered with a layer of bright green; if some of this is examined with a one-fourth inch objective, it will be found very commonly to consist of round cells, in some cases single, in others in fours; these are algæ of the Protococcus or Palmellaceæ group. In places the layer appears grey, instead of green, drier and more powdery. If a specimen of this is examined it will be found difficult to wet, and will appear dark and ill-defined under the microscope owing to entangled air. The grey colour and retained air is due to the presence of fungus hyphæ growing around and between the cells of the alga, in the denser parts matting all together, and forming, in fact, one of the pulverulent lichens. Between the patches of grey lichen and green alga portions may be found in a transitory condition suitable for examination, and in damp weather, especially, observation of the composition of the lichens is fairly easy. To attempt the examination of sections cut from a Thalloid lichen in its natural state is somewhat hopeless, as they seem to defy all the usual methods of getting rid of air in such tissues. I have had a *Cladonia* in weak spirit for months and at the end of the time it was no wetter than at first; but pieces torn with needles and well soaked in slightly warm water will often show the arrangement of the algæ, either in rows or scattered irregularly through the thallus, according to the species. It is believed that the fungus supplies to the algæ, water containing mineral matters in solution, and receives in return carbo-hydrates, which the algæ is able to manufacture under the influence of light, from a solution of carbon dioxide, owing to the presence of chlorophyll in its cells. It is probable that the amount of reciprocity between the two elements varies considerably among different species of lichens. In not a few cases perhaps the fungus actually lives as a parasite upon its imprisoned captive, giving nothing in return; but a more detailed consideration of the physiology of the relationship would here carry us too far and occupy too much space.

In conclusion, we must carefully note that both commensalism and symbiosis, though not parted by any sharp boundary line themselves, are each fundamentally distinct from parasitism. Further, though it is true that organisms living in such close relationship run a great risk of degenerating into that condition, yet, when they do so, the amicable companionship previously existing ceases at once, and as parasites they have no place in our subject.

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# FIELD MEETINGS.

By Professor G. S. Boulger, F.L.S., F.G.S.*

FIELD-WORK is one of the chief objects of local Natural History Societies, so far as it results in the registration of distributional or phenological phenomena, or in the observation of plants and animals under their natural conditions. For such field-work to be of scientific value, it is primarily requisite that it should be within definitely prescribed geographical limits. Every field club should, I think, have a precise boundary, whether that of a river basin, a county, a parliamentary division, a parish, or some radius from a centre. County associations may well, of course, overlap the districts of various minor clubs, and I think it would be well for the latter to work without regard to school clubs, which will generally do well to adopt a radius.

In collecting fossils, where precise discrimination of zones may not be necessary—in getting together fungi for subsequent determination, study or demonstration, in a foray, and perhaps in some other cases, the combined research of many pairs of eyes may lead to better results than that of small select parties or solitary work; but it can hardly be denied that the main use of field meetings is educational or demonstrational rather than original discovery.

The successful organisation of a full and valuable series of field meetings involves a considerable amount of attention to troublesome detail. This is more especially the case if the club attempt to cater for lunches or teas. For my part I certainly think that such joint meals add much to the success of field meetings, most people liking to be saved all trouble as to securing some food, as also that of hiring conveyances, and even, if possible, that of taking railway-tickets, by some simple system of coupons, a lump payment, or, at least, an order, in advance. It will, therefore, be generally desirable, if he can be got, to have a special excursion secretary, with a consultative committee, or otherwise an excursion committee, the members of which will each undertake the management of one or more excursions. Such a committee should meet in the winter, so as to plan a season's programme well in advance. Most clubs begin their excursions, I think, too late and end them too early in the year, often practically confining them to May, June and July, whereas an early spring ramble and an autumn fungus-foray might well, in my opinion, be included in every scheme.

To meet the convenience of members living in different parts of its district, the club excursions should be arranged as far as possible in divers directions, and I would suggest that the officials of all the neighbouring clubs should be consulted, and, if possible, a joint meeting held with each in its territory and another within the boundaries of the club itself. In the case of such joint meetings, the main arrangements would naturally be made by the home club.

Where there is a river, an estuary, or a portion of coast within a club's boundary, at least one dredging expedition should be attempted annually.

It will, I think, often prove useful to have a local guide who is well acquainted with footpaths, etc., in addition to the "conductors" who are responsible for the purely scientific guidance of a party, though, of course, if the guide knows the localities of interesting natural history objects, so much the better. It is, I think, often a good plan to have several "conductors" for different branches of natural history; and a short lecture in the field or several at different halts, if illustrative of things seen during the walk, will add much to its value; but the enthusiastic amateur photographer should not be allowed to waste much time, and bore the party, by taking mere "groups." These field demonstrations may usefully be arranged in a series, a botanist, for instance, taking the various classes or natural orders of plants; at successive excursions, and with a little forethought, adequate illustrative specimens can nearly always be obtained. I have generally found that if a locality is chosen for its geological or archæological interest, the botanist and entomologist are almost sure to light upon something by the way, interesting to them. Certainly the secretary or some other conductor should have a whistle to keep the party together. We should, I think, do well to have separate "recorders" for different departments, one carrying the club vasculum for the club herbarium, another the camera for the club album of scientific photographs, etc., and from their records a terse account of the noteworthy results of each excursion may readily be drawn up either by the secretary or any other member present for the club proceedings. The most interesting work of a field meeting must be done on foot, but it will often be practicable to arrange a rendezvous for those driving or cycling.

In vehicles, meals, etc., it is always desirable to keep the generally necessary expenses as low as possible, so as to exclude no one, whilst anyone wanting more can make his own arrangements.

* A paper read before the South-Eastern Union of Scientific Societies, at the Congress held at Tunbridge Wells, on April 25th, 1896.

# DRAGON-FLY GOSSIP.

By W. H. Nunney.

THE accompanying figures are reproductions from microphotos lately sent me by Mr. J. Mearns of Aberdeen, and, from the comparative aspect of larval species, are deeply interesting. Fig. 1. represents a caudal fan of the larva-nymph of *Pyrrhosoma minium*, which larva was somewhat minutely described by me in Science-Gossip for September (vol. i., N.S., p. 148), 1894. A curious thing with reference to this species is that the nymph when dead, from natural causes, and slightly decomposed, assumes much of the scarlet tint possessed by the perfect insect.

The other two figures are of the caudæ of species of *Micronympha*. The difference in general shape and the characteristic branching of the tracheæ are very noticeable and, seen apart from the species to which they belong, they hardly seem to be congeneric. It is difficult to conjecture the reason for such difference in these lamellæ, as shape can have here but little to do with function.

For many months past I have had under observation larvæ-nymphs of all groups, representing many species ; of these five are now in my rearing glasses. Probably owing to the colder climate of the north, the larvæ of Æschnæ and Libellulæ from Scotland are far more vigorous and pugnacious than their southern forms. Further, I think I am justified in saying, they attain a larger size before the final metamorphosis. This month of May, being so far hot, has produced to me one small male of *L. 4-maculata*, which emerged on the 8th about sundown. This is the first time I have observed the change to imago state in this species, and in none other have I so well been able to observe the development of the imaginal labium and appendages from the "mask" of the nymph. The process is marvellous, and needs to be watched with extreme patience and care to enable a good mental grasp of the details to be obtained, but is well worth the trouble. The hinged portion of the nymphal mask merges, I believe, into the hypopharynx of the imago, whilst the centrally divided labium, at first puffy and of no particular shape, gradually broadens out into the noticeable lower lip and palpal lobes of the imago, approaching the maxillæ and mandibles until occupying practically the same relative position as the mask of the larva.

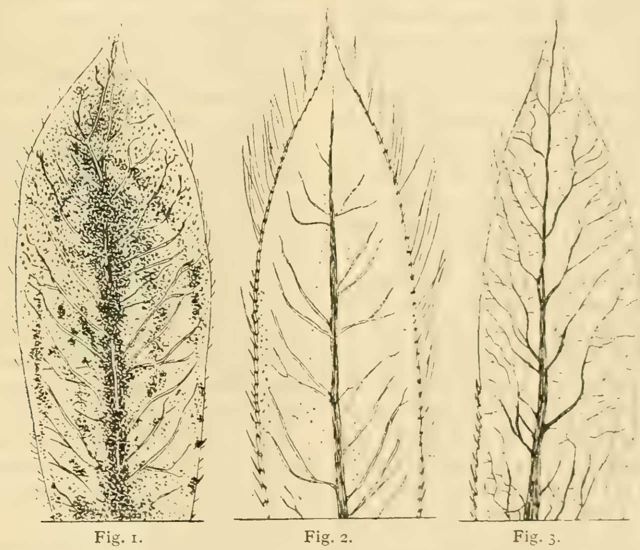

Fig. 1. Fig. 2. Fig. 3.

Tail-Fans of Dragon-Fly Larva-Nymphs.
Fig. 1, Fan of *Pyrrhosoma minium*; Fig. 2, *Micronympha pumilio*; Fig. 3, *M. elegans*.

It is curious how few parasites have been recorded in connection with dragon-flies ; *Polynema natans* attacks their eggs, flukes thrive in the intestines of the larvæ, Acari infest the wings of some perfect forms, and I have found a Dipteron, belonging to the family Borboridæ, associated with an adult Æschna, a hitherto unrecorded fact.

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# THE STUDY OF AQUATIC WORMS.

By the Rev. Hilderic Friend.

## I.—Preliminary Notes.

THE study of our indigenous fresh-water worms, and their allies which are found in damp places, though not strictly aquatic, has been greatly neglected. Until the publication, a few months ago, of Mr. Beddard's "Monograph of the Order Oligochæta," there was next to nothing published in the English language on the subject; and even now no one has taken up the group seriously, with a view to the tabulation of our indigenous species. Dr. Benham has done more than anyone else in this direction, but his studies have been limited largely to professional work as a lecturer on biology. Mr. Beddard has examined a few native forms, and some few which belong to other lands, though found at Kew and elsewhere in England. Dr. Bousfield has worked at one or two genera, but the full results of his researches have never yet been given to the world. Here, for all practical purposes, the matter ends; yet Beddard's invaluable memoir shows that many worms which are certain to occur in England have been monographed on the Continent, and a glance at the works of Vejdovsky, Vaillant, Rosa, Michaelsen, Eisen and others is enough to convince us that a very wide and fruitful field lies open to anyone who is prepared to take up the systematic investigation of the subject on English soil.

Having been for many years engaged in the study of earthworms, during which time I could not fail to accumulate a large amount of material and first-hand imformation respecting the Oligochæts outside the group usually known as earthworms, I have lately done something in the direction of tabulating these results. The outcome is exactly as I had anticipated. Almost every week brings me some new species. This may mean either (1) new to Britain, or (2) new to Science. Since the known British species may also be reckoned on one's fingers it will be seen that not much labour is required to add something new. The foreign species which have been recorded, however, are very numerous, and what is new to Britain may have been long known to Science. But when we come to consider the fact that insular faunas and floras always contain unique and interesting forms, it will not be a matter of surprise when I say that Great Britain possesses many aquatic worms which are as yet unknown on the Continent, but probably also not a few which will be confined to our islands, and therefore of peculiar and special interest. In this I am not speculating, or posing as a prophet: "We speak that we do know," and in due time I shall lay before the scientific world some facts which will be amply sufficient to justify this statement.

The season, however, for meetings, papers, and discussions is for the present at an end, and ere the next term arrives there will be full opportunity to confirm and enlarge my results. It will then be shown that the recorded species of *Marionia*, *Fridericia*, *Limnodrilus*, and others can be greatly extended; and if, meanwhile, some learned European or American confrère does not publish a new list of additions to these and other genera, which include those which I have discovered, the British fauna will be able to show a list of aquatic or limicoline worms which will compare favourably with that of other lands.

In the meantime, only good can result from stating what has already been done. In my next article, therefore, I propose supplying a list of species already known to exist in Great Britain, arranged in the order followed by Mr. Beddard, so that we may be able, in future, to show what additions are made from time to time to the indigenous species, as well as indicate which are new to Science. But, if the best results are to be secured, the work should not be left to one collector, or one investigator. It is in the nature of things that only a few possess the necessary apparatus, literature and experience to know when a species is new, or, if old, to what genus it belongs. It cannot, therefore, be expected that many of your readers will care to make a systematic study of aquatic worms, but every one who is interested in the advancement of Science can do his part by taking up the work of collecting. We want not only to discover new species, but also to record the distribution of the forms which occur, whether new or old. There is literally nothing known of the distribution of aquatic worms in England. The earthworms have been tolerably well worked, and splendid results have been achieved in the matter of the Polychæta. Now we want to work out the families which form the connecting link between the terrestrial forms on the one hand and the marine on the other. These cannot fail to be of special interest and value from the biological standpoint. We know that many fresh-water species closely approach the marine forms, and that many marine species are similar to those found in fresh water, but there is yet an immense amount of new work to be done.

Perhaps some one who reads these lines, and is longing for an opportunity to take up new work, may be asking—How can I be of service here, where

shall I look for specimens and who will tabulate the results of my gleanings? In what book can I find clear instructions for identifying specimens if I wish to work up my gleanings? Let me supply answers, and, in the first place, everyone can help by making collections in every conceivable spot. Aquatic worms and their allies are ubiquitous; from seashore to mountain height there is scarcely a spot where one or other of the species may not be sought. If the collector lives by the seaside he should be especially careful to examine estuarine runnels, dykes or ditches, backwashes, and all places where there is decaying vegetable matter. Here both water-worms and white worms will be found, as well as red worms belonging to the genus *Pachydrilus* or the related *Marionia*. Inland, every pond and ditch, stream and lake, gutter and drain, wood and copse may be explored. Under the moss which covers with a rich green garb the rugged sandstone rock will white and yellow worms be found, as well as in the timber and mould formed by the decaying of a tree or of last year's leaves. Among water-weeds which are floating in the lake or pool, at the roots of the weeds growing in old ponds or quarries filled with water, among the mud of horse-ponds and gutters—anywhere, everywhere the collector may look. The specimens may for some time evade his observation owing to their minute dimensions and his untrained eye, but in due course he will be rewarded. In the muddy margins of streams and rivers one often finds three or four different species living together. Some kinds are gregarious, others lead a more solitary life.

If the collector wishes to identify his species he must have access to the "Monograph," by Beddard, a volume which is published at two guineas net. The works of Vejdovsky and others are only accessible to men of means or to those students who have access to a first-class scientific library, such as those connected with the learned societies. For the rest, one may find scattered articles in the various journals and magazines, but as the results have all been tabulated by Beddard up till the end of 1894, and little, if anything, has been done in England since then, the "Monograph" must, for the present, be the principal source of information.

Seeing that many can collect, but only a few can work out their gleanings for want of a handy, accessible text-book or manual, it will be a convenience if someone will act as referee, and undertake to examine the collections which may be made, and report the results to suitable magazines. I can only speak for myself, but I can assure the reader who may be prepared to help in this good work, that I shall always be ready to do for the aquatic worms what I have already done for the terrestrial species during the past six or seven years. During that time I have raised the number of British earth-worms from a doubtful eight or ten to a positive quarter-of-a-hundred species; the collections having reached me from almost every part of the country.

Nearly all the species may be sent packed lightly in damp moss in tin boxes. They should be in a living condition, as results from specimens in that state are much more satisfactory than those from preserved specimens. If found in grass, leaves, straw or decaying material, they may be sent with the food; but if they live among earthy matter it often happens that they are battered in transit if the earth is included in the package. Purely aquatic forms may be usually sent in tubes or bottles with water and plants; but as they often perish quickly if kept too long confined, they should be despatched the same day as the gatherings are made. Bottles and tubes should be enclosed in tin boxes for greater security, and with each consignment should also be sent a note specifying habitat, date, locality and other particulars of a local nature, calculated to throw light on their mode of life, period of sexual maturity, and other facts of biological interest. For the present, consignments may be made to me at the address given below, and in my next article I will commence a list of species already described as British. I shall, as a rule, acknowledge by post-card any collections which may reach me, but as the work involves a great expenditure of time and money, collectors who wish for special information will oblige by sending addressed envelopes.

If Science-Gossip can thus be made the pioneer in this interesting pursuit, its resuscitation will not have been in vain.

*7, Fern Bank, Cockermouth.*

British Collections at Kensington.—We sincerely hope that the rumour is unfounded, which Mr. Henry H. Howarth refers to in "Natural Science." It is to the effect that the special collection of British Animals at the British Museum of Natural History at South Kensington is to be distributed into the general collection. We feel certain that the result would be most disastrous to the encouragement of natural science studies in this country. We know it is a department which is constantly referred to in an unobtrusive manner by many young naturalists who thus spare the time and patience of the courteous assistants in the students' rooms. Rather let us hope the collection may eventually be increased by making it a completely typical reference collection, where those of the large number of persons who cannot visit the museum on week-days may on Sundays compare their captures and obscure specimens for identification. No such opportunity elsewhere occurs in London. That the general public are interested in and educated by the special British collection one may easily find by listening to the surprised and intelligent remarks made by visitors on seeing gathered together the animals which occur in their own country.

# INTRODUCTION OF MOLLUSCA INTO BRITAIN.

By A. S. Kennard.

TO all students of the Mollusca the publication of Mr. H. Wallis Kew's book, "The Dispersal of Shells," was very welcome. For here is a work of about three hundred pages dealing entirely with the mollusca, and there is not a new species or even a new variety described in it; neither has any attempt been made to alter our old-established names. For these mercies we are indeed thankful. Mr. Kew has here brought together a large number of facts dealing with the means of dispersal possessed by freshwater and land mollusca. Whatever errors there are are those of omission rather than commission; but in chapter ix., which is headed "On the freshwater and land mollusca introduced into the British Isles by human agency," there is much to take exception. It is obvious that the question whether a species is or is not indigenous is best settled by an appeal to the geological record. This Mr. Kew has not done. I will readily admit that the published lists of pleistocene and holocene mollusca are too often unreliable; but this is not to be wondered at, very few geologists know anything about our recent shells, and, on the other hand, their fragmentary condition does not appeal to the conchologist. But in spite of this much good work has been done of late years, more especially by Mr. Clement Reid and Mr. B. B. Woodward. Mr. Kew first of all states that: "Of the forty-six freshwater species included in the Conchological Society's List of 1883, there are only two, the zebra mussel, *Driessena polymorpha*, Pall, and an American coil-shell, *Planorbis dilatatus*, Gould, which can be reasonably regarded as human importations, and, as far as I know, only one other, *Sphœrium ovale*, Fér., has ever been looked upon as even doubtfully indigenous."

That *Planorbis dilatatus* has been introduced there can be no doubt, but this is not so with regard to *Dreissena polymorpha*, Pall. Mr. Kew has collected the opinions of the "authorities," and we find that with the exception of Gwyn Jeffreys, they all have regarded it as introduced from the Continent. Dr. Jeffreys' opinions, which are set forth in his "British Conchology," conclude with the hope that this species might be found in the upper tertiary deposits in this country. This has now been done, for in Mr. B. B. Woodward's paper, "The Pleistocene Mollusca of the London District" (Proc. Geol. Ass., vol. xi, No. 8), it is recorded that Mr. W. J. Lewis Abbott found a single valve of this species at Whitefriars, London, in a deposit ten to fifteen feet from the present surface and which "most probably accumulated at the mouth of the old Fleet ditch, in the early days of the city's existence." Of course a single valve is not much to go upon, and more evidence is wanted; but there can be no doubt that the introduction of this species is by no means such a certainty as Mr. Kew states. Mr. Jeffreys is the offender with regard to *Sphœrium ovale;* it occurs with *Planorbis dilatatus* in Lancashire, and he thought that it might be *Sphœrium transversum*, Say, but as it is found in the forest bed of Norfolk this opinion is untenable. As to the statement which Mr. Kew quotes that *Planorbis glaber*, Jeff., is identical with *P. parvus*, Say, and, like *P. dilatatus*, introduced, Mr. Dall, after careful comparison of the types, has pronounced these species to be different, and *P. glaber* is one of the most abundant shells in pleistocene deposits. Of terrestrial species it seems there are several whose claims to be true natives are considered doubtful. *Testacella maugei*, Fér., is considered to be a recent introduction. It has never been found in any deposit in this country, but the same remark applies to its allies, *T. haliotidea*, Drap., and *T. scutulum*, Sow. The life-history of these species is such as to render it extremely unlikely to have been entombed in any deposit; so that at the present, geology cannot help us, and we must wait for further evidence before expressing an opinion. Passing by *Stenogyra goodallii*, Miller, and *Helix elegans*, Gmel., both of which have been introduced, we come to *Helix pomatia*, L. As regards geological evidence it is again negative. It has never been found in any deposit in this country, so that perhaps the view that it is not a native may be the true one. *Helix cantiana*, Mont., Mr. Kew remarks, "can hardly be looked upon even as a possible importation." But is this so? At the present time it is one of the most abundant species in the south-east of England, and is found in many other parts of England; yet in spite of this it is unknown in any deposit even the most recent; and this has led Mr. B. B. Woodward to express the view that it is post Roman in its introduction, and with this opinion I must concur. *Helix cartusiana*, Müll, although at the present time restricted to the counties of Kent and Sussex, had formerly a more extended range, as it has been found in an alluvial deposit at Felstead, Essex, so that Gwyn Jeffreys' later view that it was "clearly indigenous" is the correct one. *Helix pisana*, Müll, shares with *H. cantiana* and *H. pomatia* the distinction of being the only helices not found in a fossil state. This fact, and its distribution in these islands are almost conclusive proof that it is not truely a native. With regard to *Helix obvoluta*, Müll, in

addition to the evidence given by Mr. Kew in favour of its being indigenous, there is the fact that it has been found in the pleistocene of Cambridge. There is one species which Mr. Kew has omitted, perhaps because it occurs in slightly brackish water as well as fresh, namely, *Paludestrina (Hydrobia) jenkinsi*, Smith. The facts concerning this species are so recent that there is no need here to recapitulate them. First described from the Thames Marshes, where it swarms in countless myriads, it has since been recorded from Topsham, Sandwich, near Lewes, and Staffordshire. Mr. Lionel E. Adams, in 1892, suggested that it might have been introduced from the Baltic. That it is an introduction there can be but little doubt, but until it has been found in some other locality outside the British Isles it is waste of time to speculate about its true habitat. In conclusion, I must differ most heartily from Mr. Kew's statement that "we are unable to distinguish our native fauna with any degree of certainty"; a careful examination of the more recent deposits is all that is required, and when this is done it will be found that not only will our true molluscan fauna be known, but that many problems connected with distribution will be settled also.

*Benenden, Mackenzie Road, Beckenham, Kent.*

## AQUATIC HYMENOPTEROUS INSECTS.

By Fred. Enock, F.L.S., F.E.S.

UNDER the above title several minute parasitic hymenoptera have been described, notably the two found simultaneously by Sir John Lubbock (Linn. Trans., vol. xxiv, p. 135). The habits and economy of hymenoptera are so varied that the wonder is that so few have been found inhabiting either the eggs or larvæ of aquatic insects. I venture to think that one reason for this is that the study of the British hymenoptera, *especially* the Chalcididæ, has been much neglected by entomologists. The present condition of this family in our national museum proves that very little attention has been given either to re-arrange or add to our indigenous species. This is much to be regretted, as frequently an enquirer as to the name of a minute insect has the greatest difficulty in making it out. Another reason why our progress is so slow in discovering new species in this branch, is that those who study and work so hard at the rotifera appear not to have time to consider other creatures which may be drawn into their nets. As an instance of this, it was only by the merest chance that the first specimen of "an aquatic hymenoptera insect" caught last year was not emptied out without any record, for the "pondist," when he first saw it, "thought it a fly which had tumbled into the water"; but by a chain of circumstances it was rescued and recorded (Science-Gossip, vol. ii, N.S., p. 89), and there is now every probability of its life-history being fully worked out. I have already proof that this most extraordinary aquatic hymenopteron does *not* confine itself to laying its eggs in those of dragon-flies.

Last year I was fortunate in obtaining a large number of this insect (males and females), keeping many of them alive in water for a considerable time, enabling me to observe the habits and economy of the fly, which, after most careful microscopic examinations of the thoracic structure, antennæ, etc., I found to agree in every point with Haliday's description of *Caraphractus cinctus*. The unique character of this genus being the "reeled" metathorax, to show which I have prepared a number of specimens in various positions.

Owing to the kindness of Dr. R. F. Scharff, Director of the Dublin Science and Art Museum, I have been enabled to make a lengthy and exhaustive examination of the original Haliday type collection of British Mymaridæ, from which I have gained invaluable information, and though many of the carded specimens are "hoary with age" and gum, I hope, with the help of the hundreds of specimens which I have mounted for the microscope during the past twenty years, to unravel some of the mystery and doubt which appear to have surrounded this family, containing, as it does, the most minute and most exquisitely lovely of winged insects.

The strange *Prestwichia aquatica*, Lubbock, has not been observed since its first capture in 1862. May I ask all "pondists," or "*muddists*," as they delight to call themselves, to keep an extra vigilant eye open for this little-known aquatic hymenopteron, which, however, does *not* belong to the Mymaridæ. I have succeeded in breeding several species of semi-aquatic hymenoptera from various sources, but have not yet identified them.

*21, Manor Gardens, Holloway, London, N.*

Hibernation of Pararge Egeria.—I have had under observation, during this winter, a brood of the "speckled wood" butterfly (*Pararge egeria*), which I raised from ova deposited at the end of August, 1895. Some of the various members of this brood have behaved unusually during hibernation. The larger portion fed up rapidly in autumn, turning to pupæ, the remainder being still in the larval condition. It is usual, I believe, for this species to hibernate as caterpillars. I placed half the pupæ of this brood out of doors, and the rest were kept in our dining-room, where there is a fire daily during winter. No change was observed until the first week in February, when some of the chrysalides began to turn dark-coloured, and the first perfect example emerged on February 7th. About the same time, the larvæ, which had remained passive, commenced to feed, and are rapidly progressing towards maturity.—*J. H. Carpenter, Johnson Villa, Gleneagle Road, Streatham, S.W.; February 13th*, 1896.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

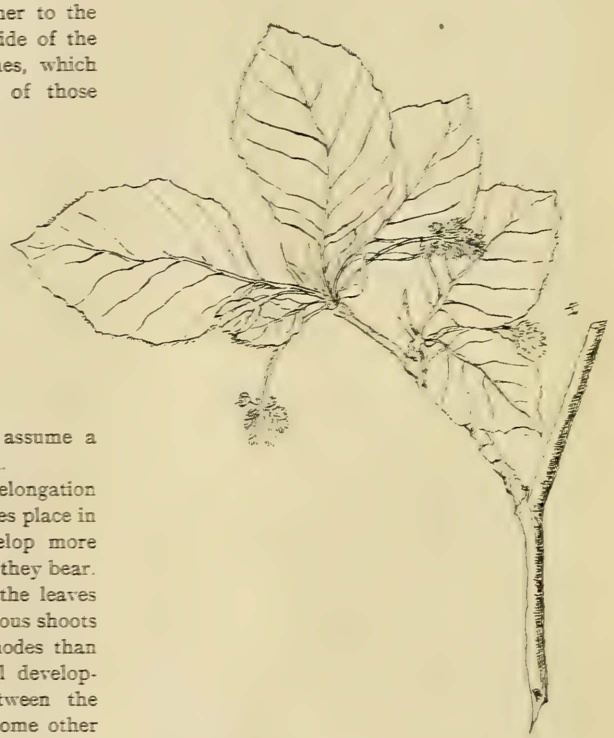
(*Continued from Vol. II., page* 321.)

## The Beech.

IN the beech (*Fagus sylvatica*, Linn.) we have another example of a tree whose leaves are alternate and so disposed as that each third leaf ranges directly over the first, the fourth over the second, and so on, thus causing them to be two ranked. Then, since it is the tendency of leaves to present one surface to the sky, the other to the earth, spreading horizontally on each side of the upright main stem, the primary branches, which spring from buds formed in the axils of those leaves, will also exhibit a two-ranked arrangement as to their point of origin, although, as they lengthen, they take a more or less upward direction; then the secondary and succeeding orders of branches to which these give rise will spread in a horizontal or fan-like manner, forming, in summer, shelves or layers of foliage. The young shoots are pendulous, indeed, at first, but as the season advances they become more rigid and assume a horizontal or even an ascending direction.

The beech is remarkable for the rapid elongation of the young leading shoots. This takes place in such a way that the internodes develop more rapidly than do the young leaves which they bear. Thus in the early part of the season, the leaves near the extremities of the young pendulous shoots are smaller in proportion to the internodes than they are when each has attained its full development. The internodes or spaces between the leaves are in the beech longer than in some other trees, being frequently two and a quarter inches or more in length in the leading shoots, and hence the intervals between the lateral branches arising from these leading shoots are correspondingly long. In the branchlets to which these lateral branches give rise it is shorter, as will just now be seen. The annual shoots of the beech are slender, scarcely a quarter of an inch in diameter, and this contributes to their flexile and pendulous character.

The flowers of the beech are never, I think, produced immediately from leading shoots of the main branches, at least, not in its early life, for in the early life of the tree such shoots give rise to leafy side-sprays or branchlets; but as the tree grows older and the branch becomes twice pinnate, some of the branchlets of the second order, instead of producing side-shoots with long internodes, like those of the primary shoot, form short branchlets with undeveloped internodes, *i.e.* spurs, the leaves of which are close together in rosettes, instead of being ranged at intervals along a lengthened axis.



Beech, in the Flowering State.

This is the preparation for flowering, but it is not by every one of the nodes that such spurs are formed, but mainly by those in the lower part of the shoot, whilst those nearer the point give rise to leafy shoots, and these (secondary) leafy shoots or branchlets produce, in the following season, spurs like those of the primary shoot. The point also of such branchlets often becomes shortened into a spur.

It is only by spurs that the flowers of the beech are produced, and not, I believe, by these until the second year of their existence as spurs. The flowers spring from the axils of the closely-packed leaves of the spur, the staminate or male flowers first or lowest in order, and these are arranged in

small pendulous catkins, several of such from each spur. The fertile or pistillate flowers are enclosed in a pod-like involucre, which eventually becomes the woody and bristly enclosure of the nut or mast. This involucre is borne on a shorter and stouter stalk than the staminate catkins, and one such involucre only is produced by each spur, and is placed near its tip. The terminal bud of a spur is always a leaf-bud, not a flower-bud, and thus the spur can go on lengthening indefinitely, although slowly. It sometimes happens, however, that a spur will forsake its character and, under the influence of a moist season or some other cause, will take the form of a slender leafy shoot, with fully-developed internodes.

growing quite near, and apparently of equal age, retained the leafy long-jointed character of their youth.

A striking peculiarity of the beech is the way in which its branches, more particularly the lower and older ones, follow the same line of growth from their origin onward to the end of the last season's shoot. I have measured one of the longest of such branches which I have seen in the neighbourhood from which I write, and I found its length to be more than fifty-five feet; and this is no extreme case. The ramification of the beech thus contrasts strongly with the abrupt changes of direction which we see in the gnarled branches of the oak and in some examples of the wych-elm.

RAMIFICATION OF THE BEECH.

One may constantly find branchlets which have begun as spurs, and, as such, have grown barely half-an-inch in the season, the leaf-scars being placed as close as possible above each other, and then shooting out with internodes of as much as two inches in length. The tendency to form spurs varies in different seasons, but it usually increases with the age of the tree, and thus old trees show fewer and fewer of the long lithe shoots which characterised their early growth, and gradually assume a stiff and short-jointed habit, eventually becoming bare and stagheaded in aspect. There is, however, much difference in this respect between individual trees. I have seen one tree quite covered with fruiting spurs, whilst others

This length of branch without change of direction arises partly, perhaps, from the long-jointed habit of growth, but more especially from the fact that the bud at the end of each leading shoot is not as in the elm and in the lime, an axillary bud, but is the end of the axis itself, which in autumn closes up into a winter bud possessing greater force of development than the axillary buds below it. In some cases the yearly shoot lengthens for an inch or more beyond the last leaf before closing up into a winter bud, but in other cases there is no space between the last leaf and the terminal winter bud, the leaf-scar being found close to the base of the bud; but in these instances we always find at least a rudimentary axillary bud between the leaf-

scar and the end bud, proving that this latter is really a portion of the axis. At other times this last axillary bud will be found nearly as large and vigorous as the terminal bud. When the two buds are thus close together, at the end of the year's shoot, the axillary bud seems to have almost as much force of development as the terminal bud, and to share with it the future leadership, so that a forking of the branch is the result. This seems to occur chiefly in the upper part of the tree.

The angle which the branches make with the main stem, and the secondary branches with their parent branch, is small, usually less than half a right-angle, but the older and longer limbs soon lose this, for after ascending for a little they are made to arch and bend downward by the weight of branches and foliage. The delicate spray at their extremities shows for the first season or two the flat fan-like or shelf-like habit of growth which has been mentioned; but after a while the slender twigs take an upward direction as they lengthen, and become irregularly twisted and crowded. In the upper part of the tree the leading branches all ascend, and, being crowded with secondary branches and spray, have a somewhat brush-like form when seen in winter.

Considered as to its general features the beech is one of our noblest forest trees. There is considerable difference, however, in the growth and ramification of different individuals accordingly as the leafy or flowering habit of growth prevails. The finest examples are those in which the vigour of the tree is expended in forming lengthened leafy shoots rather than in the production of short-jointed spurs, for an excess of these latter is apt to give the branches a stiff, unclothed appearance.

The stem is massive, often short when the tree is growing alone, but when amongst other trees, and more especially if in a grove of its own kind, the stem rises as a lofty column, crowned above by the dense head of foliage, and deriving peculiar beauty and refinement of character from the smoothness of the pale-grey bark with which it is clothed. Towards its base the stem often spreads out into buttress-like ribs or projections, connected above with the larger and lower branches, and continued downward into the main roots which run for a while above the surface of the ground in an irregular sort of network with deep hollows between them. This is more particularly the case when the tree happens to be growing on a sloping bank.

The skeleton of the beech as seen in winter, shows the main branches sweeping onward from their origin to their tip in an unbroken, although often pleasingly curved line, and crowded towards their end with slender branchlets and sprays. These, in summer, are clothed with a wealth of foliage, and they lie often so closely one upon another as to leave little room for such breaks and hollows as give variety of light and shade. The extremities of the branches with their spray stand out, indeed, from the general mass, but their outline is too pointed and tapering, the spray too widely scattered, to present any broad surface on which light can rest.

Beech, in the Winter State.

Their beauty lies rather in their feathery delicacy. This is best seen in the elegant and often drooping terminations of the lower branches, particularly in early summer when clothed with their shining and silky-margined foliage. When suffered to grow undisturbed the branches often feather down almost to the ground.

(*To be continued.*)

## TUNBRIDGE WELLS CONGRESS.

A CONGRESS of delegates from the principal scientific societies and field clubs of south-eastern England was held at Tunbridge Wells on April 25th last. It was largely attended; amongst others, representatives were present from the Tunbridge Wells Natural History and Philosophic Society, Tunbridge Wells Amateur Photographic Society, Bromley N.H.S., Brighton N.H.S., North Kent N.H.S., Sidcup N.H.S., Horsham N.H.S., Hastings and St. Leonards N.H.S., Rochester N.H.S., West Kent N.H.S., New Brompton and District N.H.S., Ealing N.H.S., Geologists' Association, East Kent N.H.S., Dover N.H. and Antiquarian Society, Eastbourne N.H.S., Folkestone N.H.S., North London N.H.S., City of London College Scientific Society, City of London N.H.S., Sidcup Literary and Scientific Society, Maidstone N.H.S., Society for the Protection of Birds; and the Commons Preservation Society. There was also a large attendance of both ladies and gentlemen interested in the Congress; some of whom had come long distances.

The Rev. T. R. R. Stebbing, M.A., F.L.S., President of the Tunbridge Wells Society, was elected Chairman. The Congress was originated as well as largely organized and carried out by Dr. George Abbott, Hon. Secretary of the same society, the object being to pass certain resolutions for the formation of a union of natural history and scientific societies of south-eastern England. The Chairman explained the objects, which were concisely set out in the following letter, written by Dr. Abbott to Sir Douglas Galton, the President of the British Association:—

"The Natural History and Philosopical Society, Tunbridge Wells; March 2nd, 1896. Sir D. Galton. —Dear Sir,—I beg to enclose you a programme of the Natural History Congress which is to be held here next April. Some remarks in your Ipswich address encourage me to draw your attention to the possible usefulness and importance of such unions to the British Association. As soon as our Union is established and we are in working order, I shall propose that our district is divided up amongst the different societies—to each being allowed a definite portion of the map as its sphere of work. Next, that each society shall nominate and, with their consent, elect suitable person or persons in every village in such district as honorary corresponding members of the respective societies and associates of the South-Eastern Union of Scientific Societies. Each society would offer the members: (1) Free admission to their lectures and excursions; (2) copies of their Transactions; (3) the use of their library; (4) assistance in naming of specimens, and with the formation of school museums. The corresponding members, in return, would be asked to: (1) Forward surplus natural history specimens to their societies' museum. (2) Supply prompt information on the following subjects: (*a*) new geological sections; (*b*) details of wells, borings, springs, etc.; (*c*) finds of geological and antiquarian interest. (3) Answer such questions as the British Association or the local society may require; (4) keep an eye on historic buildings; (5) assist the Selborne Society in carrying out its objects. Such appointments would be certain to stimulate individual scientific work in the parishes, and, if care were exercised in making the appointments, they would ere long be much appreciated. If we are able to accomplish this in the south-east of England, I think there would be no difficulty in starting and carrying on similiar Unions all over England. Each Union would be certain to have one or more representatives at your Annual Congress, and in this way, as soon as the Unions were universal, you would be in touch with persons in almost every village in the United Kingdom. Your circular letters of inquiry could then be sent out to the secretaries of each Union, and soon quickly distributed to all localites. I assume, of course, that there is little or no need to increase the number of members of the British Association, and it is only because I think it would make its work still more thorough and universal that I advocate this new extension of its important work. On its usefulness to the Natural History Societies I need not dilate, as you doubtless know there are two or three Unions actively engaged in doing scientific work, and in direct communication with the Association. In time, too, I hope ours will become equally useful. After reading your Ipswich address, I cannot help thinking that to this new scheme the same arguments might be applied as those quoted by you which were given originally in favour of the establishment of the Association fifty years ago. In conclusion, may I venture to suggest (*a*) that it would be an advantage if a delegate from the British Association attended our Congress at Tunbridge Wells; (*b*) that your Council should consider the advisability of encouraging the formation of similiar unions (ten or twelve) in the different districts of the United Kingdom. A grant of £25 from your funds could do much, in the course of one or two years, to establish all the Unions. —Yours truly, G. Abbott." Upon the reading of this letter, on the invitation of the Chairman, Mr. Griffith, Assistant General Secretary of the British Association made some general remarks upon the advantage of such Union, and the possible support which the Association might render at a future time.

On the proposition of the Chairman the following resolution was carried: "That the delegates from various scientific societies of Surrey, Kent, and Sussex, assembled in Congress at Tunbridge Wells on the 25th of April, 1896, agree that the Congress shall meet annually, by invitation, at the home of one or other of the associated societies." It was agreed to add London, Middlesex, and Hampshire to these counties. It was then decided that the Congress should meet annually at the home of one of the associated societies, in a different town each year, and that Dr. Abbott should be the Hon. Secretary of the Union; the Rev. Mr. Stebbing being elected President for the ensuing year. Tunbridge Wells was then selected as the next meeting place. Several papers were then read, dealing chiefly with the subject of the meeting, and a most successful Congress brought to a close. The day's proceedings included a short excursion before the meeting, the visitors being shown the principal features of the immediate neighbourhood, including the outcrop of Tunbridge Wells sandstone. The members of the Tunbridge Wells Society also entertained the visitors to luncheon and tea.

OWLS' PELLETS WANTED.—I should be much indebted to anyone who will send me owls' pellets, stating (if possible) the species to which they belong, the locality; also whether there is game in the neighbourhood, and, if so, of what sort. (The amount of postage will be returned.)—*Lionel E. Adams, 77, St. Giles' Street, Northampton.*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Report of Observations of Injurious Insects and Common Farm Pests during the year* 1895; *with Methods of Prevention and Remedy.* By ELEANOR A. ORMEROD, F.R.Met.Soc., F.E.S. 166 pp. royal 8vo, with 30 illustrations and 2 plates. (London: Simpkin Marshall, Hamilton, Kent and Co., Limited, 1896.) Price 1s. 6d.

We have, elsewhere, on several occasions protested that our Government, as represented by the department over which Mr. Chaplin now presides,


HIPPOBOSCA EQUINA.—1 and 2, nat. size and magnified from life; 3, pupa removed from puparium. Puparium, nat. size and magnified. (From Miss Ormerod's "*Injurious Insects.*")

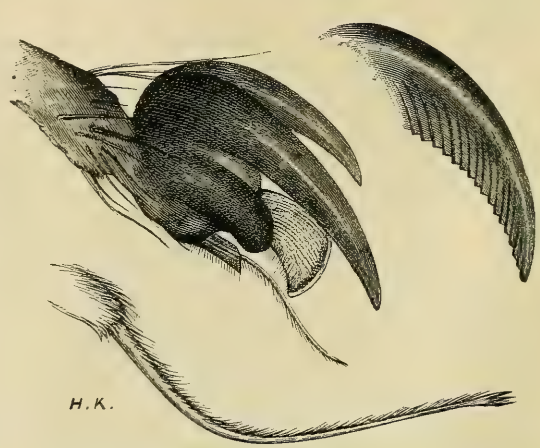
should allow Miss Ormerod to go on unaided year after year at what must be considerable sacrifice, doing what most enlightened Governments do for themselves. Here has this lady, single-handed, been for more than twenty years trying to instil some elementary knowledge of their insect foes into British farmers and fruit-growers. The feeble leaflets issued by "the department" are a remarkable contrast to the excellent reports of Miss Ormerod, the nineteenth of which is now before us. If these were circulated by Government aid through all village schools in rural districts, and intelligently explained by the teachers, much good might be attained. A leading feature of the report just issued is an article on flies injurious to horses and cattle. It is accompanied by two finely-drawn plates of the foot of forest-fly (*Hippobosca equina*) from two aspects. There are also figures in the text, two of which we reproduce to show the admirable manner these reports are illustrated. In consequence of the last military manœuvres having taken place in the New Forest, where *Hippobosca* is frequently troublesome to horses, some attention has been drawn to these flies. Miss Omerod has collected much information about these pests, some being of scientific value to dipterists, as well as to horse owners.

*A Contribution to our Knowledge of Seedlings.* By the Right Hon. Sir JOHN LUBBOCK, Bart., M.P., F.R.S., D.C.L., LL.D. 288 pp. crown 8vo, with 282 figures in the text. (London: Kegan Paul, Trench, Trübner and Co., Limited, 1896.) Price 5s.

This is a popular edition of Sir John Lubbock's well-known larger work on the germination of plants, and forms vol. lxxix of "The International Scientific Series." So little is understood of the reason why the forms of cotyledons should differ so greatly from the subsequent leaves of plants, that any knowledge attainable for unravelling this mystery of nature should be valuable. The subject is so easily studied, and so deeply hidden are the causes of variation in form of the cotyledons, that the circulation of this new popular edition of Sir John's work will open up a wide field of investigation. The comparative study of the earlier stages of plant-life among many persons who previously saw little interest in seedlings will be much extended by the issue of this book. It is needless to add how plainly written, well arranged, and encouraging to early investigators are the pages in the new edition of "Seedlings" by this versatile author.

*The Royal Natural History.* Edited by RICHARD LYDEKKER, B.A., F.R.S. Illustrated by 72 coloured plates and 1,600 engravings. (London and New York: Frederick Warne and Co.) Published in 1s. parts.

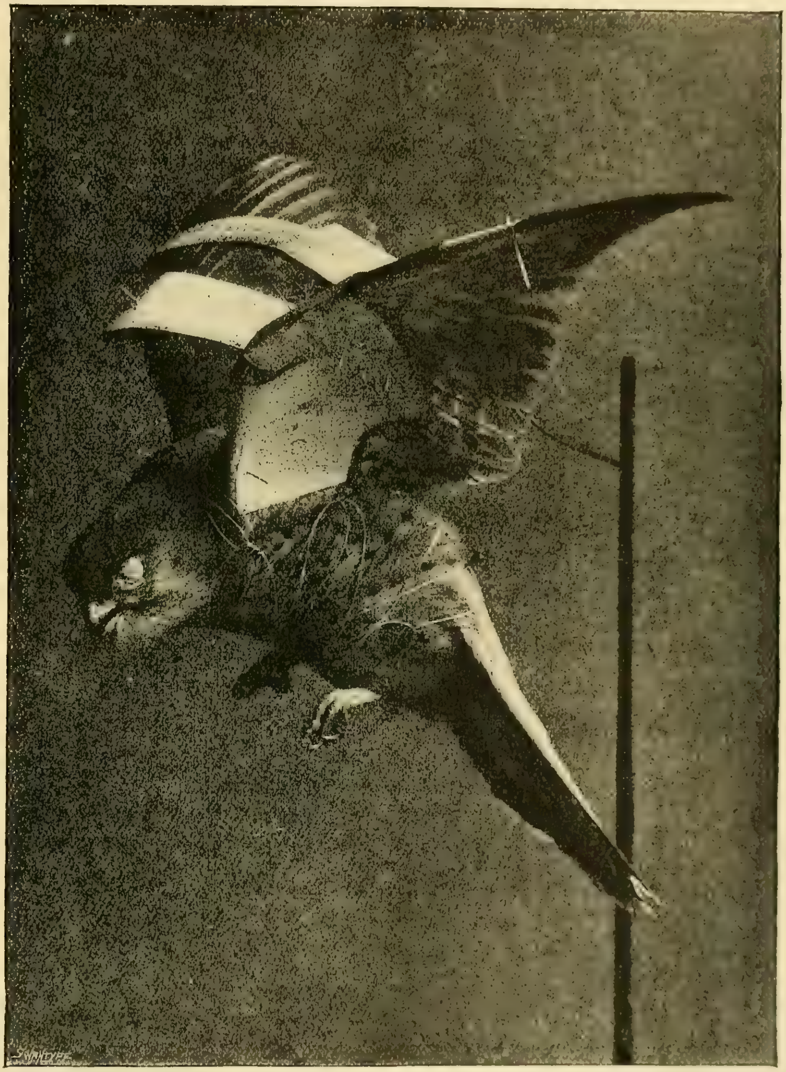
Part 31 of this fine work is out, and with it we leave the vertebrates and enter some description of the various classes of invertebrates. Indeed, the last few pages of Part 30 were also devoted to them, commencing with the sea-squirts or Ascidians. In Part 31 are two brilliantly coloured plates of insects, and the title-page and index to Volume v. In this number also are some orders of insects, Hymenoptera, Diptera, and a portion of the Lepidoptera.




FOOT OF H. EQUINA, showing double claws, central process and long prickly bristles. A portion of the claw of *H. maculata.* (From Miss Ormerod's "*Injurious Insects.*")

*Artistic and Scientific Taxidermy and Modelling.* By Montagu Browne, F.G.S., F.Z.S., 463 pp. small 4to, with 22 full-page illustrations, and 11 others in text. (London: Adam and Charles Black, 1896.) Price 21s.

This is a beautifully-produced book, well printed and handsomely illustrated. It is "A manual of instruction in the methods of preserving and reproducing the correct form of all natural objects, including a chapter on the modelling of foliage." The veteran author is the well-known curator of the Leicester Corporation Museum, who, years ago, issued a small handbook on the same subject. This work is of a far more pretentious character, and is one of the most important on taxidermy yet published in England. The recent revolution in natural history museum management—so ably led by Sir William Henry Flower at South Kensington—has raised the craft of taxidermy to a fine art. Our older manuals have therefore become out of date, and some such work as that before us was needed. This book is divided into ten chapters on the various sections dealt with, including tools used in the work, killing and preservative agents, modelling compositions, collecting animals for subjects, treatment of mammals, birds, reptiles and fishes; also chapters on modelling flowers, foliage, fruits, fungi, algæ, etc.; concluding with a chapter on mounting animals in an artistic manner and a



HAWK (KESTREL). Showing method of bracing and binding the feathers.
(From Montagu Browne's "*Artistic Taxidermy and Modelling.*")

bibliography of these subjects. Perhaps the most instructive chapters are those devoted to modelling the bodies and limbs of mammals, birds or fishes, and the making of artificial foliage, flowers and other vegetable products for decorative purposes. Mr. Montagu Browne must indeed be successful in this department as will be gathered from the following quotation taken from page 405 in connection with his description of a case of herons in the Leicester museum. "An odd thing in connection with this case, and one specially flattering to the artist, is that few people realize that the elm-leaves are modelled, and frequent questions have been addressed to the attendant as to where the water is kept in which the stumps are presumably placed to keep the leaves green, whilst one or two visitors have gone a step further, and enquired if it is the heat of the room which has caused the stumps to throw out leaves!" The bibliography is extensive and a large number of works are mentioned, but as might naturally be expected, several are overlooked; we are, however, pleased to see included the fine work on Taxidermy by Oliver Davie, noticed in these pages in July last. The illustrations are well reproduced, suitably selected, and will be found generally useful: the least pleasing, perhaps, being that of fighting tigers, one of which seems as though suffering from a wasting disease of the tail. Plate x. is effective, and we reproduce it with pleasure for the benefit of our readers, by permission of the publishers.

*A Handbook to the Birds of Great Britain.* By R. Bowdler Sharpe, LL.D. Vol. iii., 346 pp. 8vo, with 93 coloured plates. (London: W. H. Allen and Co., Ltd., 1896.) Price 6s.

This is one of "Allen's Naturalists' Library," a series we have on several former occasions had the pleasure of noticing. The volume before us contains the continuation of the ducks, and that difficult class, the waders. Dr. Bowdler Sharpe has brought the information on each species well up to date, and there is much pleasant reading for ornithologists, and abundant information for all who take only a casual interest in bird life. Dr. Sharpe has managed excellently to write some admirable chapters on the waders without plagiarising other authors, a task far from easy. His quotations are well chosen, especially some on the habits of certain American species closely allied to members of our own fauna. Dr. Sharpe's knowledge of the group is extensive and, what is important, fresh in his mind, as he has only recently completed a work on the shore-birds in the "Catalogue of Birds." The book is dated February 26th of this year, so that it is hardly possible to obtain more recent information.

*The Student's Lyell: A Manual of Elementary Geology.* Edited by John W. Judd, C.B., LL.D., F.R.S. 658 pp. 8vo, with coloured map and 736 figures. (London: John Murray, 1896.) Price 9s.

All students of geology will welcome Professor Judd's admirable new edition of "Lyell." As stated in the preface by Dr. Judd, the progress of geological science during the last quarter of a century has rendered necessary very considerable additions and corrections, and the re-writing of a large portion of the book, but there has not been any interference with the author's plan and methods, which have so characterised Lyell's work. With the aid of this new edition and a series of specimens, now so readily referred to in the public museums, or obtained from Mr. Russell, 78, Newgate Street, London, the young student should find geology easy indeed, compared with the time when Lyell first issued the work.

## MICROSCOPY

Interesting Leeches.—I was much interested in Mr. Burton's note on the above (Science-Gossip, vol. ii., N.S., p. 306). I think his leeches must be the same kind I have sometimes found feeding on water-fleas. The manner in which they do this is very curious, and can be well observed under a two-inch objective. They insert the small end between the valves of their victim, and when firmly attached, a little telescopic sucker goes to work probing about, and sucking out all the soft internal parts, when it reaches the eye the black pigment is seen to shoot down the sucking-tube in a stream. I have sometimes found them attached to the glass of my tanks by their posterior sucker, and waving about with a water-flea impaled on the small end. I have one now on the glass with about thirty young ones under it, it has been in the same position every time I have looked at it, for at least a week past. Like Mr. Burton I have been unable to find any description of these creatures, and should be glad of further information as to their life-history and habits.—*W. J. Chaffey, 294, Windham Road, Bournemouth.*

What Becomes of Hydra.—The appearance of Major-General Varrand's note under this very pertinent title (Science-Gossip, N. S., vol. ii., p. 276), and the fact that Mrs. Climenson has mentioned my name in connection with this interesting subject (Science-Gossip, vol. ii., p. 314), has induced me to make a brief statement of the facts to which she refers in her "Notes of a Home Naturalist." Finding Mrs. Climenson was not acquainted with *Hydra vulgaris* and *H. viridis*, I put up about a dozen of the former and two or three of the latter in a small tube, with some bits of Anacharis; also specimens of *Cauthocamptus* and *Cyclops* as food for the Hydra. I filled the tube with water from my aquarium, corked it tightly, and packed it carefully in cottonwool in a small box. I was greatly surprised to learn that, on the arrival of the little parcel, not one Hydra could be found, though the other occupants were very much in evidence. I could not think of any reason for the failure of the Hydra, so I despatched another precisely similar tube, with a precisely similar result, except that about three of the Hydra had not quite disappeared, though they did so afterwards. All the Hydra were extremely small—mere dots, in fact, when contracted—and I thought that perhaps the *Cyclops* and *Cauthocamptus* were too much for them, owing to their having knocked the little Hydra off their perches, and perhaps killed them with the blow. I rather incline to the belief that it was the railway journey that upset them, though I received safely a similarly packed tube of fair-sized Hydra, sent by Mr. Bolton, of Birmingham, all of which were alive. I do not think that it was the close confinement that was responsible for their demise, as I kept some afterwards in a similar tube, and they lived for some days. The apparently absolute and complete disappearance of them is the most mysterious part of the question; they seem to have vanished into thin air—or water, rather. I shall await further notes on the subject with much interest.—*C. Nicholson, 202, Evering Road, London, N.E.*


CONDUCTED BY FRANK C. DENNETT.

| | 1896. | *Rises.* h.m. A.M. | *Sets.* h.m. P.M. | *Position at Noon.* *R.A.* h.m. | *Dec.* |
|---|---|---|---|---|---|
| *Sun* | June 1 | 3.50 | 8.5 | 4.40 | 22° 10′ N. |
| | „ 11 | 3.45 | 8.14 | 5.21 | 23° 9′ |
| | „ 21 | 3.45 | 8.18 | 6.2 | 23° 27′ |
| | | *Rises.* A.M. | *Souths.* A.M. | | |
| *Moon* | „ 1 | 0.7 | 4.39 | | |
| | „ 8 | 1.32 | 9.29 | | |
| | | *Souths.* P.M. | *Sets.* P.M. | | |
| | „ 14 | 2.54 | 10.56 | | |
| | | P.M. | A.M. | | |
| | „ 21 | 8.45 | 0.27 | | |
| | | *Souths.* P.M. | *Semi Diameter.* | | |
| *Mercury* | „ 1 | 0.53 | 5″ 7 | 5.36 | 22° 34′ N. |
| | | A.M. | | | |
| | „ 11 | 11.48 | 6″ 0 | 5.16 | 19° 37′ |
| | „ 21 | 10.56 | 5″ 3 | 5.1 | 18° 15′ |
| *Venus* | „ 1 | 11.15 | 5″ 0 | 3.56 | 19° 41′ N. |
| | „ 11 | 11.28 | 4″ 9 | 4.48 | 22° 5′ |
| | „ 21 | 11.41 | 4″ 9 | 5.41 | 23° 27′ |
| *Mars* | „ 1 | 7.49 | 3″ 1 | 0.32 | 1° 39′ |
| | „ 11 | 7.37 | 3″ 2 | 0.59 | 4° 30′ |
| | „ 21 | 7.25 | 3″ 4 | 1.26 | 7° 14′ |
| | | P.M. | | | |
| *Jupiter* | „ 21 | 2.46 | 15″ 0 | 8.47 | 18° 38′ N. |
| *Saturn* | „ 21 | 8.43 | 8″ 4 | 14.45 | 13° 24′ S. |
| *Uranus* | „ 21 | 9.12 | 1″ 9 | 15.14 | 17° 45′ S. |
| *Neptune* | „ 21 | 11.5 | 1″ 9 | 5.9 | 21° 34′ N. |

MOON'S PHASES.

| | | | |
|---|---|---|---|
| *Last Qr.* ... June 3 | 8.2 a.m. | *New* ... June 11 | 8.43 a.m. |
| *1st Qr.* ... „ 18 | 11.41 a.m. | *Full* ... „ 25 | 6.55 a.m. |

ON June 14th there is an occultation of Jupiter. The disappearance takes place at 9h. 52m. p.m.; the reappearance at 10h. 43m., but the planet will be too near the horizon for this latter to be observed.

THE MOON.—*The Strand Magazine* for April contains an interesting paper on "Lunar Scenery" by Sir R. Ball, prefaced by a reduced copy of Mr. T. K. Mellor's outline map (Horne and Thornthwaite), and containing copies of some Lick and Paris photographs.

PLANETOIDS.—It is stated that, although Dr. Max Wolf, of Heidelberg, has discovered so many of these little bodies—the last on April 2nd—he has never directly observed one of them through the telescope, his discoveries being made from the photographic plates, on which, whilst stars are shown as points, planets appear as short lines owing to their motion.

COMET.—Professor Lewis Swift, Director of the Lowe Observatory, South California, discovered a comet on April 13th. It was situated in R.A. 3h. 39m. Dec. N. 19° 40′, in other words, 5° south of the Pleiades. It was described as bright. Since then it has travelled rapidly north, so that on May 3rd, Mr. E. R. Blakeley, of Dewsbury, found it in R.A. 3h., Dec. N. 57°, still travelling to north-east. Its diameter appeared about 3′, it was irregularly round, and fairly bright. Dr. Schorr calculates that it passed its perihelion on April 17th, 1896, 12h. 14·4m. The comet appears to be a new one.

PERSONAL EQUATION, in making telescopic observations, is a subject which perhaps hardly receives so much attention as it should. A singular instance of this has just been brought to light. Professor Ed. E. Barnard has published the results of his observations on the satellites of Uranus. He states that Ariel is about half a magnitude brighter than Umbriel; of the other two, Titania and Oberon, he concludes that they are of constant, nearly equal brightness, though his earlier observations made it seem that they both varied to the extent of fully a magnitude. He has been forced to the conclusion that if there are two nearly equal lights, to his eye the lower appears fainter.

NEW LUNAR ATLAS.—It is to be hoped that ere long Professor Dr. L. Weinek, of Prague, will succeed in having his photographic atlas of the moon finished and published. To that end, Miss C. W. Bruce, of New York, has generously contributed 1,250 marks, and the Imperial Academy of Science at Vienna, has granted a subsidy of 500 florins. Such an atlas would prove a far better "court of appeal" than any of the published maps could possibly do, in difficulties such as arose in October, 1866, when the late Professor Schmidt missed Linné, a crater which Lohrmann had described as "very deep," and in its place found only a bright patch and a little hill. Another time when such a work would have proved of inestimable use would have been in 1877, when Dr. Hermann Klein, on May 27th, discovered what is believed to be a new crater, now known as Hyginus N. Those who have familiarized themselves with selenographical detail have long felt the need of such a work.

METEORS.—On April 12th, about 8 h. 5 m., a brilliant meteor was visible, having a slow motion from west to east. Reports of it are to hand from places so far distant as the Isle of Wight and Renfrewshire. In London its altitude above the north-north-east horizon was about 25°. Mr. Frank Sich, jun., Niton, Isle of Wight, writes:—"On Sunday night, April 12th, about five minutes past eight, I was fortunate enough to see at Niton, in the Isle of Wight, a very large meteor. It was travelling somewhat slowly, and rather low down in the north-east, and going towards the east. I did not observe that it left any trail behind it, but attached to it on the west side was a small cone of red light. The meteor-light was yellow. It suddenly 'went out' without any audible report." It helps much if those who witness these beautiful phenomena, note, as nearly as possible, their path amongst the stars, or, at least, their altitude, and also, in making known the same, state their exact place of observation. This is of use in the calculation of the meteor's distance above the earth. From such a comparison of observations, M. Camille Flammarion calculates that the great meteor of February 10th, which caused so much sensation and, indeed, damage, at Madrid and neighbourhood, must have been at the height of 14·4 miles at the time of its explosion. Thus he writes in the *Bulletin* of the Société Astronomique of France.

## SCIENCE GOSSIP

In our last number appeared a note on "Woodpeckers near London," by Mr. J. A. Cooper. We regret to say that this genial ornithologist contracted a cold at Eastertime which speedily caused his death. He will be much missed at the meetings of some London societies.

On April 20th, Mr. Noble bought at auction, at Mr. Stevens' rooms in Covent Garden, for 160 guineas, a great auk's egg which was a fine specimen, though very slightly damaged on one side. It was from the collection of the late Mr. Tuke.

We have received the first three parts of a new monthly magazine devoted to ornithology, bearing the name "The Ornithologist," edited by Mr. H. K. Swann. Each number contains an illustration. The articles and notes on birds are of a popular character, and many are of interest. We wish our new contemporary success.

Little more than a year ago we noticed in these pages a clever book by the Rev. W. Clement Ley, M.A., on "Cloudland." Even then Mr. Ley's health had so far failed that his son was entrusted with seeing the work through the press. We have now to announce the death of this talented meteorologist and author, under peculiarly sad circumstances.

Miss Eleanor A. Ormerod, so long known as an authority in this country on economic entomology, will have a fine display, illustrating injurious insects, at the forthcoming Bath and West of England Agricultural Society's Show at St. Albans. In addition to actual material supplied by farmer correspondents, which will be fully explained, this lady's sister has prepared some large diagrams.

We have received a specimen of a scientifically constructed tobacco-pipe made by the Biltor Company, of 93, Oxford Street. The new arrangement is excellent for stopping the nicotine and oils from entering the mouth. This is attained by inserting an absorbant cartridge into the stem, which effectually arrests the noxious oils, and renders smoking a pleasure, not only to the smoker, but to his neighbours who probably dislike the smell of a foul pipe more than genuine tobacco smoke.

The London Geological Field Class commences its eleventh year of most useful work. The teaching is given during excursions made on Saturday afternoons between the end of April and middle of July. The excursions are of a popularly scientific character and are open to ladies as well as gentlemen. They are conducted by Prof. H. G. Seeley F.R.S., who gives short lectures upon the districts visited, which are all within easy access of London. Further particulars as to membership and future excursions may be obtained by writing to the Hon. General Secretary, Mr. R. Herbert Bentley, 31, Adolphus Road, Brownswood Park, South Hornsey.

Helix pomatia is recorded by Mr. Wilfred Mark Webb, from Chapple, in Essex, which is a new locality for this edible land-snail.

In the number of Science-Gossip for September last, we wrote an article upon the preservation of our fauna and flora. It advocated the formation of reserves for the purpose, and among other places suggested Wicken Fen. We now hear this fen is for sale, and could be purchased for a comparatively small sum. Can anything be done to apply the property to this purpose?

Messrs. Ross and Co. of 111, New Bond Street, W., have issued two fully illustrated catalogues of optical instruments. One of these is devoted to the most modern photographic apparatus and the other to microscopes and objectives, hand-telescopes, field and opera-glasses, and many other necessities to our comfort and enlightenment. These catalogues are priced sixpence each.

The Agricultural Department of the University Extension College at Reading has issued its second annual report upon field experiments on hay, pasture and root crops, carried out in 1895. The reports are by Mr. Douglas A. Gilchrist, B.Sc., the director of the department, and Mr. P. Hedworth Foulkes, B.Sc. The latter portion of the report deals with insect and other animal ravages of crops in the district.

Dr. Albert Günther, F.R.S., is the President of the Linnean Society for the coming year. He recently retired from the keepership of the Zoological Department at the British Museum. Born at Esslingen, in Würtemburg, sixty-six years ago, his knowledge of the English language is most perfect, and most of the scientific papers which have contributed to make his name so well-known in connection with zoology were written in English.

Now that all the natural science museums in London are open on Sunday afternoons, many naturalists, who through their daily occupation rendering it previously impossible, will have golden opportunities of visiting these magnificent institutions, as well as the picture galleries. The little known, but splendid Museum of Practical Geology, in Jermyn Street, adjoining Piccadilly Circus, is by no means the least interesting.

The Journal of the Marine Biological Association for February contains some notes and a figure relative to specimens of female common eels in the museum of the Royal College of Surgeons in London, displaying nearly mature ovaries. There are also important papers on the "Culture of Sponges," by Mr. E. J. Allen, B.Sc., and upon the "Improvement of Sponge Fisheries," by Mr. George Bidder. It does not appear that, as at present understood, the artificial culture of sponges is commercially profitable, though exceedingly interesting from a scientific point of view.

Prof. T. D. A. Cockerell of Las Cruces, New Mexico, U.S.A., is anxious to establish for scientific research a biological station in that State. He proposes to combine with it a holiday home for rest for over-worked students and teachers. The climate is magnificently healthy and bracing. It is intended to carry on the establishment without "interference of politicians and other self-interested or ignorant persons." We sincerely hope the plan will succeed, for it sounds just like the place to which we are longing to retire.

## SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

"Das Tierreich" (The Animal Kingdom. Friedlander, Berlin, 1896). The German Zoological Society has launched upon the gigantic task of a complete synopsis of the animal kingdom. Since the publication of Linné's "Sestema Naturæ," no attempt has been made to deal with all living forms of animal life, yet the number of known species has, since that period, increased so inordinately, that the want of a comprehensive review has become but too painfully apparent to all working zoologists. It is therefore proposed to issue a concise exposition of the animal kingdom, by the review and delineation of all the species that are now living or have become extinct within historic times, and of their systematic groups, which will serve as basis and starting-point of all future systems. This large undertaking will express the present condition of our knowledge, and will be based on a treatment which will partake of the nature of both criticism and compilation. To ensure the completion of the enormous material within a reasonable time, it has been decided to divide the work among a large number of specialists, which will at the same time give each division or group the highest possible scientific standard. The uniform treatment of the various subjects will be controlled by a number of carefully planned rules and regulations. For the naming of forms and systematic groups, the rules adopted by the German Zoological Society will be strictly adhered to; for abbreviations of names of authors the Berlin list will be taken as basis. The work will be under the general editorship of Geh. Reg. Rat., Prof. Dr. F. E. Schulze, who will be assisted by a committee composed of the President of the German Zoological Society and Geh. Reg. Rat., Prof. Dr. K. Möbius and a number of editors for the chief divisions of the animal kingdom. The following divisional editors have already been appointed: Professor F. Blockmann, of Rostock, for Brachiopoda; Professor Oscar Boettger, of Frankfurt-on-Maine, for Batrachia; Professor M. Braun, of Königsberg, for Platyhelminthes; Professor O. Bütschli, of Heidelberg, for Protozoa; Professor C. Chun, of Breslau, for Cnidaria and Ctenophora; Professor F. Dahl, of Kiel, for Arachnoidea; Professor C. W. von Dalla Torre, of Innsbruck, for Hymenoptera; Professor L. Doederlein, of Strassburg, for Mammalia; Professor E. Ehlers, of Göttingen, for Bryozoa; Dr. W. Giesbrecht, of Naples, for Crustacea; A. Handlirsch, of Vienna, for Rhynchota and Neuroptera; Dr. W. Kobelt, of Schwanheim, for Mollusca; H. J. Kolbe, of Berlin, for Coleoptera; Dr. H. Krauss, of Tübingen, for Orthoptera; Professor R. Latzel, of Klagenfurt, for Myriopoda; Professor J. Mik, of Vienna, for Diptera; Dr. G. Pfeffer, of Hamburg, for Fishes; Professor A. Reichenow, of Berlin, for Birds; Professor F. E. Schulze, of Berlin, for Porifera; Dr. A. Seitz, of Frankfurt-on-Maine, for Lepidoptera; Professor J. W. Spengel, of Giessen, for Vermes, exclusive of Platyhelminthes and Tunicata. A further list of specialists for the minor divisions is given, several of which, however, are also editors of the primary divisions. In addition to the well-defined species the work will include the enumeration of insufficiently described and dubious species, as well as sub-species and varieties, important stages of development, alteration of generations, and specially remarkable biological conditions. The geographical distribution will be given under each species, together with the principal literature, and a complete list of synonyms, so that the work when complete will contain information on every name used in Zoology since the introduction of binomial nomenclature. To facilitate the grasp of the subject systematic synopses and numerous keys for the determination of groups and species will be added. To each separate division will be appended a list of abbreviations used, a systematic index, and a complete alphabetical register. On the completion of each group further indices will be given, and at the end of the whole work, a general index and general register. The language employed will be chiefly German, but in exceptional cases, English, French, or Latin may be used. The work will be published in parts, each of which will treat of one or more related groups, but they will appear independently of any systematic sequence. The size of the parts will vary, but will not in any case consist of less than three sheets. For some of the larger groups the number and size of the parts is already announced. For instance, the Platyhelminthes will consist of four, the Crustacea of eleven, the Hymenoptera of thirteen, the Mollusca of fifteen, the Reptilia of three, the Birds of sixteen parts. The completion of the work, it is estimated, will take twenty-five years. Each part can be had separately, and the price will depend on the size; but to those who undertake to subscribe to all parts published during five years the price will be seventy Pfennig (about 9d.) per sheet, and will be somewhat less for larger parts, or a trifle more for smaller ones; the price for separate parts will be increased by one-third. The first part is promised for the commencement of 1897. In case of a sufficient number of subscribers being found, a separate edition, on writing paper, will be issued, as well as one printed on only one side of the paper. A specimen part has already been issued, treating of the Helicozoa, by Dr. F. Schaudinn, consisting of twenty-four pages including the index and a list of abbreviations of citations exclusive of those contained in the list of the Zoological Record. On considering the period over which the publication of this gigantic work is to be spread, one fact forces itself on the mind, *i.e.* that those parts issued towards the end of this period, to whichever divisions or groups they may happen to belong, must of necessity be more complete and up-to-date than those issued earlier, and unless appendices to those earlier parts be given, we fail to see how the absence of uniformity in this respect will be overcome. In whatever way those responsible for the production of this immense undertaking will deal with this question, there is no doubt that all zoologists, no matter in what part of the world, will be under a great obligation to the Zoological Society of Germany for initiating such a work, the utility of which can only be appreciated by those whose sphere of labour happens to be cast amongst the productions of the animal kingdom.

# BOTANY

White Variety of Common Centuary.—With reference to Mr. Gardiner's note (Science-Gossip, vol. ii., N.S., p. 272) I have often found *Erythræa centaurium*, with pure white flowers, in the neighbourhood of Cushendall, co. Antrim; this is a sea-side locality.—*H. W. Lett, M.A., Aghaderg Glebe, Loughbrickland, co. Down.*

Gyromitra esculenta at Staines.—During an excursion of the Lambeth Field Club to Staines, on Easter Monday, April 6th, a fungus, which was at first thought to be a morel (*Morchella esculenta*), was picked up on a grassy island in the middle of a stream flowing into the Thames. Since then it has been identified as a specimen of *Gyromitra esculenta*, a closely allied form, but of very rare occurrence in Britain. In this species the pileus is lobed and irregular, with a hollow interior, and the stem is short, widening at the base, and having a whitish downy (villous) covering. Some doubt exists as to the desirability of treating this species as an esculent, in spite of its specific name.—*F. P. Perks, 41, St. Martin's Lane, Charing Cross, W.C.*

Fruiting of Auracaria.—A fine specimen of *Auracaria imbricata*, twenty feet in height, well furnished with branches down to the ground, in a cottage garden on the north road from Newry, co. Down, produced fine fruit-cones in 1894. As they were a novelty to me I was interested in observing them as I drove that way from time to time. I hoped they would have come to perfection, but though the locality is only a hundred feet above sea-level and well sheltered, the prolonged frost of 1895 affected this tree so severely as to kill all the branches except a few at the very top; in fact, the tree is now a most unsightly object and as good as dead. Other *Auracaria* trees of which I know, and in more elevated and exposed situations, are still flourishing; so, perhaps, the effort to perfect its fruit made this Newry tree more susceptible to the effects of the cold of last year.—*H. W. Lett, M.A., Aghaderg Glebe, Loughbrickland, co. Down.*

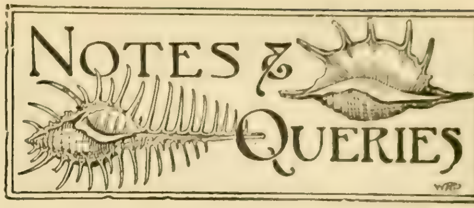
Atrophy of Tree-branches.—Mr. Carrington in his article on "Atrophy of Tree-branches" (vol. ii., N. S., p. 281), desires that exceptional cases may be recorded. Frequently when threading my way through the pine-wood at Esher, in Surrey, for a few hours' work in the Black Pond, I pass a case of fasciculation in *Pinus sylvestris* where this growth is very noteworthy. It occurs near the tree-top, and is not, I am afraid, very accessible for study, unless with the aid of climbing-irons. It is, however, worthy the careful observation of any person interested, who may find himself in the neighbourhood of the pond. The tree is situate a short distance from the round-house, and can scarcely be missed.—*George T. Harris, London, S.W.*

Atrophy of Tree-branches.—As you invite discussion on your paper on "Atrophy of Tree-branches" (Science-Gossip, vol. ii., N. S., p. 281), I should like to make a few comments. After mentioning a remarkable mass of twig growth on a Scotch fir you say that "these abnormal bunch-like growths are caused by a condition of atrophy in the growth of the branch." Surely this kind of growth would be more truly termed hypertrophy, as there is really no want of life, nourishment or growth in the branch, only that the latter is changed in form. These abnormal growths are usually caused by gall-mites or fungi. "The bird-nest-like masses," often known as witches' brooms, so common on birch trees, are caused by one of these gall-mites (*Phytoptus* spec.) which infest the buds and feed on the young leaves within them, stopping their growth to a certain extent and also that of the shoots. In consequence, the buds break into much shorter shoots than usual. The buds on these also being attacked, a dense mass of twigs is soon formed. The witches' brooms on fir-trees of various kinds are the result of the tissues of the trees being infested by certain fungi, see Kimer and Oliver's "Natural History of Plants."—*Geo. S. Saunders, 20, Dents Road, Wandsworth Common.*

Chickweed Wintergreen.—Among other things which came under my notice in 1895, as being above average, was the large number of seed-producing plants of that interesting representative of our indigenous flora, *Trientalis europœa.* Although there might not have been more plants in flower than in other seasons, more of them succeeded in ripening their fruit. It has been customary for me to find many of the seed-vessels of this plant falling to the ground when the flowers fade, but there has always been some portion which has produced fruit. Being one of the most beautiful of our native flowers, and a comparatively provincial one here, not appearing in the warmer parts of Britain, the matter of its bearing fruit may be worthy of being noticed, as I have certainly seen mention in some standard work that it does not readily or abundantly produce seeds. This, doubtless, is governed in general by the area within which observations are taken of plants, the nature of one season from another being also a factor in this direction, the variations of the seasons causing variations in the development of plants. Some, of course, are more easily acted upon than others, and it would be interesting to know where in course of its range and in what proportion it produces seed.—*W. Wilson, Alford, Aberdeenshire.*

Prussic Acid in Vegetable Physiology.—Of the various substances which enter into the composition of the plant body, the proteids are beyond doubt the most important. They are the characteristic constituents of the protoplasm with which life itself is so closely associated. The problem of how these complex bodies are elaborated from the simple food stuffs available to the plant has long been a riddle to physiologists and still is one of the darkest processes we have to deal with. A step forward, however, is marked by the valuable contribution which Dr. M. Treub has recently made to the subject. He has investigated the formation and distribution of hydrocyanic acid in the tissues of one plant (*Pangium edule*), and although, with scientific caution, he refrains from drawing generalisations from this one case, thoroughly though he has examined it, he has yet succeeded in laying a firm and sure foundation for future work in a subject which may be said to have as its final reward the explanation of the secret of life. For who can deny that in the chemistry of protoplasm lies hidden the mystery of life? Proteids are compounds of such simple elements as carbon, oxygen, hydrogen, nitrogen, and sulphur, which,

however, are bound together in an almost inconceivably complex manner. We know that the green leaves manufacture carbohydrates (compounds of carbon, oxygen and hydrogen) from carbonic acid gas and water under the influence of sunlight. We are also aware that the roots absorb from the soil the nitrates (compounds of oxygen and nitrogen) which, thanks to micro-organisms, have appeared there, and that the sulphur compounds of soil enter the plant by the same route. In other words, we know that within the plant are present materials, available as food, which contain between them the same elements as a proteid; but, starting from this consideration, we have hitherto been unable to explain any of the steps which lead to the formation of the complex organic nitrogenous compounds from these substances. Pflüger long ago (1875) held the purely hypothetical view that there was a close connection between the proteids of living protoplasm and cyanogen, in fact that in living proteids the nitrogen was associated with carbon in the form of cyanogen (in which two atoms of carbon are united to two atoms of nitrogen). Treub has now made it certain that in *Pangium edule* hydrocyanic or prussic acid (carbon, hydrogen and nitrogen united together) is the first visible nitrogenous compound to appear in the constructive processes. He has found that both in the cortex and pith of the stem there are special cells particularly rich in prussic acid. This substance can also be detected in the pericycle. In the leaves it is usually to be found in all the parenchyma cells, in the flowers and fruits it is also present. The great channel along which hydrocyanic acid moves from part to part of the plant is the soft base or phloem. If the outer layers of the leaf-stalk be cut through, or conduction in any other way hindered, an accumulation of prussic acid takes place in the blade of the leaf whilst none of the acid can be detected for some distance below the point of section. By a careful study of such cases as these, it could be definitely established that hydrocyanic acid is formed in the leaf and conveyed away to other portions of the plant by the soft bast. Another interesting fact that was determined was that those special cells of the cortex or pith, filled with prussic acid in their earlier days, became the seats of proteid accumulation in later times. Among the factors necessary for the formation of prussic acid, two were found to be absolutely essential (1) That carbohydrates be present; (2) That a supply of nitrates be forthcoming to the leaf. Light it was found was not directly necessary. Treub employed the "prussian-blue test," familiar to all chemists in ascertaining the presence or absence of hydrocyanic acid in any tissue of the plant. The position, then, that we have reached through Treub's researches, is that in *Pangium edule*, prussic acid—a comparatively simple compound—is the first visible nitrogenous organic body to be synthesised in the plant; whether this is the case throughout the vegetable kingdom or whether it is the plan adopted in this single instance only, or in one or two other plants as well, remains for the future to decide. Any who feel interested in the subject should certainly refer to Treub's original article ("Sur la localisation, etc., de l'acide cyanhydrique dans le *Pangium edule*" Ann. du Jardin Botanique de Buitenzorg. Vol. xiii., 1895, pp. 1–89), or to the report of the Paper he read before the British Association at Ipswich last year, or to the admirable summary in the "Botanische Zeitung" (Bot. Zeit., No. 7, 1896, p. 102).—*Rudolf Beer, Elmwood, Bickley, Kent.*




LEPIDOPTERA IN NORWAY.—Can any one tell me through the pages of SCIENCE-GOSSIP what lepidoptera I am likely to find near the Nordfjord in August, and if there are many species then out in that region?—*(Rev.) J. M. Hick, Trimdon Vicarage, Trimdon Grange, R.S.O.*

ELEPHUS AFRICANUS.—Can any reader imform me through your pages where I might be able to obtain some information relative to the occurrence of *Elephus Africanus* in the fossil state in England? If so he would greatly oblige.—*J. H. Cooke*, 123, *Monks Road, Lincoln.*

PIED-WAGTAIL IN WINTER.—An apparently solitary specimen of the pied-wagtail is spending the winter here and is constantly to be seen searching for food in the garden and about the buildings. Is it not somewhat unusual for this bird to be found so far north at this time of the year.—*Vernon B. Crowther-Beynon, The Grange, Edith Weston, Stamford; February 9th*, 1896.

LITTLE AUK IN SUSSEX.—As an addendum to Professor Newton's article on page 1 of the last volume of SCIENCE-GOSSIP, it is perhaps worth a note in your pages, that a group of eight specimens of this bird was exhibited at West Croydon Hall, by Mr. Thorpe, the Croydon taxidermist, last autumn, which had been taken near Hastings during the great frost in the early months of 1895.—*Ed. A. Martin*, 62, *Bensham Manor Road, Thornton Heath.*

PREHISTORIC HUMAN REMAINS.—In a note (SCIENCE-GOSSIP, vol. ii., N. S., p. 313). Mr. Kane remarks that it is curious that no reference to the interesting find of prehistoric human remains near Le Puy, Auvergne, is made by writers of antiquity of man. He appears to have overlooked Lyell's "Antiquity of Man" in which there is a pretty full account (3rd ed., 1863, p. 194). Scrope, in his "Geology and Extinct Volcanoes of Central France (2nd ed., 1858, p. 182), also mentions the subject, and gives two sketches of the spot where the fossils were found.—*W. J. Atkinson*, 76, *Christchurch Road, Streatham Hill, London, S.W.*

WHERE NOT TO FIND COAL.—A sentence in your review of the "Missouri Geological Survey" reminds me of the attempt which was made last year to find coal in Silurian strata at St. Kilda, Melbourne, Australia. An old lady left a considerable sum of money for the boring to be made with this object in view. Certainly it cannot be said that coal has never been found in Silurian rocks, but on the other hand it does not seem credible that anyone with any pretence to a little geological knowledge, would have had a trial boring made for coal through strata of that age. As the author of the survey says, a very little study of the strata soon determines whether or not the rocks of any given district are likely to furnish coal. The Silurian strata of St. Kildare did not.—*Ed. A. Martin*, 62, *Bensham Manor Road, Thornton Heath.*

# GEOLOGY

Geology at Belfast.—We have to record a remarkable week of geological studies conducted by Professor G. A. J. Cole, M.R.I.A., F.G.S., of the Royal College of Science for Ireland, which terminated at the end of March. A paper on the structural details of the Antrim rhyolites, read at the microscopical meeting of the Belfast Naturalists' Field Club, commenced the course, lantern-slides showing the microscopic character of local lavas, varied by others of rhyolitic areas in other parts of Great Britain. The scheme included six excursions for the study of geology in the field, three hours each evening being devoted to a class on petrography, necessarily limited to a dozen students, resembling a "special course" at the Dublin College of Science.

The first field excursion was to Squire's Hill, where the series of Cretaceous quarries were visited, Professor Cole pointing out and explaining the methods in which the many dykes had intruded through the sedimentary rocks; also drawing the attention of his students to the difference between the Irish Cretaceous series and that of England, showing the persistence of upper chalk fossils such as *Belemnitella mucronata* through the limestone to the base of the glauconitic chalk, whilst the general palæontological characters suggested that the chalk must represent the Senonian, the greensand the Turonian, and the somewhat barren lower beds (which, however, furnished *Pecten quinquecostatus* and other characteristic fossils) belonged to the Cenomanian series. A visit to the basaltic quarry led the party across Carr's Glen to the Cave Hill quarry, with its great dyke showing horizontal columns, which traverses the chalk and the overlying basalt.

The second excursion made an early start for Stewartstown, involving a walk of ten miles through fine rolling country, passing Tullahoge, and on to Tullyconnell for the Permian strata that are so rare in Ireland. The survey memoir describes a section on the roadside, but this is no longer visible, a block below the road, nine or ten feet long, and a poor exposure in an adjacent cottage garden, being all that now remains. The rock is very fossiliferous. The Castle Farm quarries at Stewartstown furnished fossils from the Carboniferous Limestone, some pits in the lower coal measures being passed on the return drive to Dungannon.

On Friday the party walked from Dundonald, among the interesting partially-cemented gravels, full of travelled pebbles, by the old road to Scrabo, a halt being made by the way to visit and photograph the Kemp stone. Professor Cole utilised the pause for lunch on the slope of Scrabo, whence a glorious prospect was obtained of Strangford Lough and the distant coast of Antrim, by explaining how this outlier of Triassic sandstone was formed by the slow sinking of shallow-water lakes, a parallel being found in the present condition of the Great Salt Lake in America. Saturday was devoted to the rhyolitic area, which has been specially studied by Professor Cole for some years, and magnificent weather favoured the party as they drove from Doagh to Sandy Braes, and proceeded to visit the innumerable exposures that are found over the charming heathery moorland, where the glassy lavas of the old volcano are displayed in marvellous variety. The causes of this variety were fully explained by Professor Cole, who said that hitherto geologists had sought for acid lavas from Hungary or Lipari, and only a few realised the stores that lay decomposing on the hilltop around Tardree. Lunch at the southern quarry on Tardree was followed by a walk across Carnearny Brae into Antrim, visiting a hole where the rock showed singularly large felspar crystals found by Mr. A. G. Wilson, and an interesting boss of glassy rhyolite, with both spherulitic and perlitic structure, discovered by Professor Cole some time ago.

The geologists made a fresh start on March 23rd, the place selected being Barney's Point, near Magheramourne, where abundant Lower Lias fossils were obtained. Fragments of Rhaetic rock led Professor Cole to point out that these Liassic beds had probably slipped forward over the lower strata. Crossing the backbone of Islandmagee, the party inspected the fine basaltic cliffs at the Gobbins, longing for the access to their face which will be given, should the walk projected by the Northern Counties Railway Company ever be constructed. The return to the ferry showed the opposite hills blue with approaching rain. Yet splendid weather favoured the final excursion on the following day, which included a visit to the mountain range of Mourne. The dykes south of Newcastle, which traverse the uptilted Ordovician strata, frequently traversed themselves by later dykes, were visited, Professor Cole demonstrating their age by explaining that the Mourne granite which cut through them was of the same age as the rhyolites of Antrim.

The party subsequently ascended by the Bloody Bridge and Glen Fofany, when another address taught the students that many so-called moraines were in reality great detrital fans of mountain débris. Mr. La Touche (Geol. Survey of India), who was with the party throughout the week, described the making of such a fan in the Himalayas in a few hours, when a mountain torrent swept everything before it, spreading a mass of mud and stones over the lower ground, the river at first flowing over its handiwork, and subsequently cutting through it. An ascent of Thomas Mountain, to see the fragment of the Ordovician strata that remains—a relic of the great sedimentary arch under which the molten granite gathered—was followed by a descent through the grounds of Donard Lodge.

The value of such a week cannot be overestimated; and any field club that has such a chance to offer to its members well deserves its name. This is the third time that the Belfast Club has been fortunate in securing instructions from Professor Cole, and the importance of such continuity is manifest. The presence of members of other clubs recalls pleasantly the recenty-founded Irish Field Club Union, with its useful plan of admitting members of other clubs who may be temporarily in a strange place to the honorary membership of the club of the locality.

## TRANSACTIONS

Royal Meteorological Society. — At the meeting of this Society on Wednesday evening, March 18th, Mr. E. Mawley, President, in the chair, Mr. Frederic Gaster, F.R.Met.Soc., of the Meteorological Office, delivered a Lecture on "Weather Forecasts and Storm Warnings, how they are prepared and made known," which was illustrated by numerous instruments, diagrams, and lantern-slides. Mr. Gaster said that in the preparation of forecasts the position held by the barometer was so much more important than that of any other instrument that its action must be fully comprehended if the rest of the work was to to be at all clearly understood. The lecturer having fully explained this, referred to the use of a single isolated instrument, and showed how new light was thrown on the observer who could have telegraphed to him simultaneous observations from a large number of places scattered over a considerable area of the earth's surface. The kind of variation in the distribution was dealt with, isobars were drawn, and the phenomena which they exhibit in the way of high and low pressure areas described. An explanation was given of the terms "cyclonic" and "anticyclonic," and the generally opposite characteristics of these two systems were referred to. Mr. Gaster next drew attention to the obvious importance of the variation in the weather over a given area caused by alterations in the position of the cyclonic and anticyclonic systems, and the importance of the fact that the former tended to move round the latter from left to right. This led to some remarks on the indications observed when disturbances were advancing towards our islands from different points. Attention was drawn to secondary systems, both of high and low pressure, the forms they assume, and their effect on the weather which, but for their presence, would probably have accompanied their primaries; and the necessity for allowing for such systems in sending warnings to our coasts. The lecturer then remarked on the value of auxiliary information, such as is to be obtained from decided changes in the direction of the wind, sudden changes of temperature, the movements of clouds at different levels, observations made at high level stations, and telegrams from the United States. Mr. Gaster next explained how the information is made known to the public. Forecasts are issued by the Meteorological Office in the Daily Weather Report, and also communicated to the press, etc. Hay harvest forecasts are issued to certain selected authorities who circulate them as much as possible in their neighbourhood. Storm warnings are telegraphed to our coasts with instructions to hoist the cone—point up—when the gale is probable from northerly to easterly points, and point down, when from southerly to westerly points. In conclusion, the lecturer drew attention to the marked improvement which had occurred in these warnings in recent years, and to some of the occurrences which from time to time caused failures.

The South London Entomological and Natural History Society.—February 27th, Mr. R. South, F.E.S., President, in the chair. Mr. A. E. Waters, B.A., of Cambridge, and Mr. J. A. Lucas, B.A., of Kingston-on-Thames, were elected members. Mr. R. Adkin exhibited specimens of *Hybernia leucophearia*, from Abbotts' Wood. The pale and dark-bordered were found in equal proportions and only one black specimen was taken. Mr. Short, a bred series of *Acronycta myricæ*, with a dipterous and a series of hymenopterous parasites, *Ichneumon fuscipes* from its larvæ. Mr. Dennis, two living females of *Vespa germanica*, taken in February. Mr. Perks, two living specimens of *Rhagium inquisitor*, L., from Epping Forest. Mr. McArthur, communicated notes on the occurrence and life-history of *Coccyx cosmophorana*, and *Retinia resinella*. He said that the former was always more or less common at Rannoch, where the latter was unknown. As far as he had observed the larvæ of the former did not in Scotland feed in the way described by Kaltenbach. He was convinced that the larvæ did not normally feed on the refuse of *R. resinella*, but that it did so at Forres he was perfectly certain. A long discussion ensued, during which it was suggested that *R. resinella* had not abstracted all nourishment from its food, which was hence available as pabulum for *C. cosmophorana*, and so presumably the latter species had different habits in different districts. Mr. Billups then read a Paper entitled "Hymenopterous and Dipterous Parasites reared by Members of the Society during 1891-2," and exhibited in illustration a large number of species with the hosts they had preyed upon.—March 12th, the President in the chair. Col. Partridge exhibited bred specimens of *Phigalia pedaria*, from Epping, of a unicolorous grey with dark nervures; a specimen of *Agrotis puta*, having alternate dark and pale bars; and the specimen of *Hadena albifusa*, taken by him at Portland, August 15th, 1888. Mr. South, bred specimens of *P. pedaria*, from a black female taken at Macclesfield. The males were of the same form as those of Col. Partridge, but most of the females were black. Mr. Adkin, specimens and sections of the nodules of *Retinia resinella*, to illustrate remarks made at the previous meeting. Mr. Frohawk, bred male and female of *Nyssia lapponaria*, the ova having been obtained from Mr. Cristy, the female was alive. Mr. West, of Greenwich, a female *N. hispidaria*, taken in West Wickham Woods. Mr. Lucas, a carding spider taken at Hampton Court. Mr. Barrett, the series of the various species of the genus *Dianthæcia*, from his own collection, including every shade of both *D. carpophaga* and *D. capsophila*, from various British localities; *D. barretti*, with Continental *D. luteago* for comparison, and the only known Welsh and English examples; *D. cæsia*, with Continental forms for comparison; *D. albimacula*, from Dover, Folkestone and Portsmouth; two drawers from the cabinet of Mr. Sydney Webb, containing the same species, and including the two *D. compta* from the late Mr. Bond's collection; and also Mr. Adkin's series of *Dianthæcia*. In the discussion which ensued, Mr. Barrett considered *D. carpophaga* and *D. capsophaga*, as one and the same species, he was convinced that *D. barretti* was but an extreme local form of the Continental *D. luteago*, and felt almost inclined to say that there never was a British specimen of *D. compta*. Messrs. Adkin and Tutt preferred to consider the first-named as closely allied species possessing extreme parallelism in

their range of variation. Various members testified as to the doubtful origin of British *D. compta*. Mr. Hall said that he always found *D. carpophaga* larvæ on *Lychnis vespertina*, and scarcely any on *Silene*. Mr. McArthur gave instances of how *D. conspersa* always resembled the colour of rocks or walls on which it sat in various districts. Mr. Tutt said that *D. cucubali* was the only member of the genus which came to sugar, and that it was also double brooded.—*Hy. J. Turner (Hon. Report Sec.)*

North London Natural History Society.—Meeting on Thursday, March 12th, 1896, Mr. C. B. Smith, President, in the chair. Mr. C. S. Nicholson, of "Elmsleigh," Tottenham Lane, Hornsey, was elected a member of the society. The Amphipyridæ were shown by Messrs. Prout and Bacot, and the former gentleman also exhibited specimens of *Tæniocampa* of *miniosa*, bred this year from Chattenden larvæ. Mr. Bacot had recently seen a bat flitting about Cheapside. Mr. L. J. Tremayne drew attention to an article by Mr. Tutt, in the February number of "The Entomologists' Record," on the nomenclature of the Zygæninæ. Assuming Mr. Tutt to be correct, he rather agreed with his view that it was high time that naturalists should take to naming this family correctly, and he suggested that the society, which is at present bound by the "Entomologist" list, should consider the advisibility of revising its nomenclature. Mr. C. Nicholson opened a discussion on The Amphipyridæ. He illustrated his remarks with specimens of the family, including *Mania maura* from Hale End, and var. *virgata*. He also exhibited a pair of wings of each species denuded of their scales, in order to show the neuration, and some explanatory drawings. He explained the nomenclature of the family, and proceeded to deal with the species in all their stages. He alluded to the neuration of the imagines, and said that *Mania maura* had an extra nervure. He also touched on the various classifications of the family by different authors. Mr. Prout disapproved of the genus *Amphipyra*, the species of which he thought were certainly generally distinct. Mr. Bacot remarked that the young larva of *Pyramidea* is certainly a looper when it first leaves the egg-shell.—On Saturday, April 11th, the society visited the Zoological Gardens, Regent's Park. The party met in the Insect House, and afterwards visited most of the other objects of interest, especially attractive being the young gorilla (*Anthropopithecus gorilla*), and chimpanzee (*A. troglodytes*), also the manatee. Many other objects were discussed, and several specimens of the moth *Biston hirtaria* were found on trees in the gardens during the afternoon. The gardens are always attractive to naturalists, but are especially well worth visiting at this season of the year.—*Lawrence J. Tremayne (Hon. Sec.)*

Greenwich Natural History Society.—A meeting was held on February 5th, 1896, Mr. Andrew Kerr, President, in the chair. Dr. Calder exhibited a number of lantern-slides—many of them prepared by Professor Glaister, of Glasgow—of bacteria that are inimical to man. Mr. M. F. Dunlop exhibited living and mounted specimens of Desmids, Rhizopoda, Infusoria, Rotifera, and Entomostraca. The Secretary gave a demonstration of the remarkable optical properties of the Japanese Magic Mirror. Illustrations of about twenty different designs of mirror-backs were thrown on the screen, and seven Japanese mirrors were shown, several of which exhibited the magical phenomenon. —*G. W. Niven, Hon. Sec., 27, Brymner Street, Greenock.*

## NOTICE TO SUBSCRIBERS.

The New Volume (Volume III.) of Science-Gossip commences with this number, the Publishers having decided not to issue the March, April and May numbers, which have fallen into arrear. The issue for June will therefore be numbered 25, to maintain the sequence. This course is adopted in order to bring information up to date, and to ensure in future the publication of the Magazine regularly on the 25th of each month.

Subscriptions for Volume III. will commence with the June issue.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

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The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc. to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

A few nests and imagines of Pelopæus flavipes (the American mud-dauber) in exchange for other species.—Harry Moore, 12, Lower Road, Rotherhithe, S.E.

Offered, "Handbook of Geological Terms" (very rare) in exchange for "Prehistoric Europe," "Ice Age," or other standard geological works.—J. H. Cooke, 123, Monks Road, Lincoln.

Exotic. European and British Lepidoptera for others.—Rev. J. M. Hich, Trimdon Vicarage, Trimdon Grange, R.S.O.

Offered. 100 slides of upper chalk (polyzoa) for the same number of lower cretaceous forms, or student's microscope worth not less than £3 3s.—W. Gamble, 2, West Street, New Brompton, Kent.

For exchange, fine specimens of Fluor spar (blue John), amorphous, in crystals, purple or banded, many varieties; also fine carb. limestone fossils, many species. Desiderata, Nautili from all formations and good ammonites, particularly from Wealden and greensand.—W. F. Holroyd, Greenfield, near Oldham.

Science-Gossip, 1875 to 1887 inclusive, excepting August, 1875. What offers?—J. F. Greenway, 11, High Street, West Bromwich.

Slides, teleutospores, fungi, and others offered; wanted, postage stamps (including many off old or foreign letters and parcels), insects, other slides, etc.—Dr. Bryan, Thornlea, Cambridge.

# MOSSES AND HEPATICS OF MOURNE MOUNTAINS.

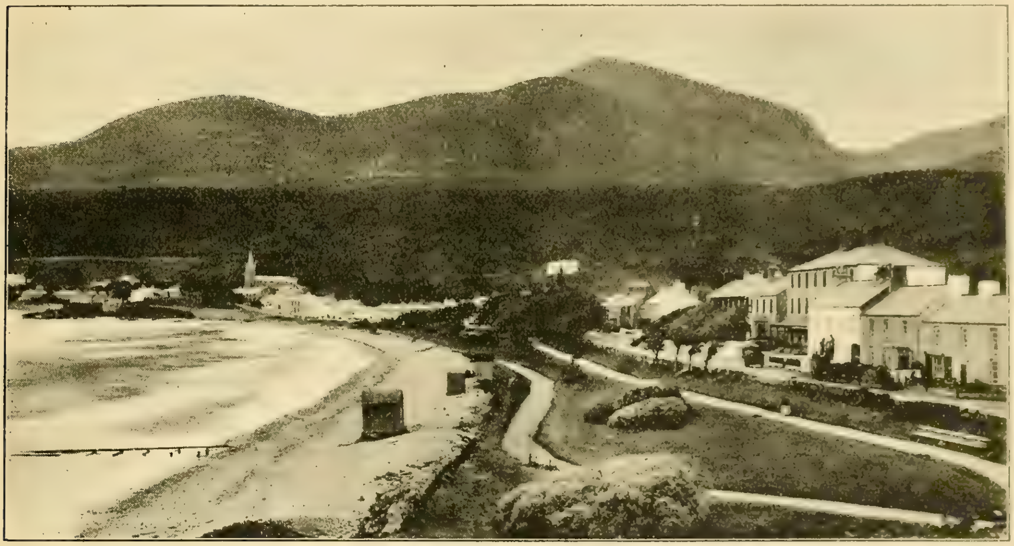
By Rev. H. W. Lett, M.A., M.R.I.A.

THE Mourne Mountains in the County Down have been introduced to the readers of Science-Gossip (Science-Gossip, 1895, p. 85) as worthy of a visit from tourists who are phanerogamic botanists. But they are even still more worthy of the attention of students of the cryptogamic flora of this country, as I hope in some measure to show in this paper.

Mosses, hepatics, lichens, fungi, fresh-water algæ, desmids and diatoms abound in and about the Mournes The whole district is a veritable happy hunting-ground for such. It is not too much to assert that in no other part of the kingdom are so many species, more especially of the first two families just mentioned, to be found within easy access of a railway station and excellent hotel accommodation.

There are extensive sand-dunes, several miles of sea-side rocks, wooded glens through which tumble mountain streams, wild stretches of boggy moorlands intersected by long deep valleys with their rivulets, and elevations—more or less rugged—up to 2,796 feet altitude, with a few lakelets. So that every variety of suitable habitat for these lovely forms of vegetation exists within the area.

The investigation of the cryptogams of this district has not been altogether neglected in the past, though doubtless there is still much to be done. Mr. Templeton, of Belfast, a well-known and accomplished botanist and zoologist at the beginning of the present century, made some notes on the mosses and hepatics which will be found in the North-East of Ireland—"Flora" and Supplement (published in 1888-95)—while in recent years Mr. S. A. Stewart, F.B.S.E., of Belfast, editor of this "Flora"; the Rev. C. H. Waddell, Mr. J. J. Andrew, and the present writer, have collected mosses and hepatics in various parts of these mountains. A large portion of the results of their work is recorded in the above-mentioned "Flora," and in a "Report on the Mosses, Hepatics, and Lichens of the Mourne Mountains," by H. W. Lett, read before the Royal Irish Academy, and published in the "Proceedings" of that body in 1890 (pp. 265-326). As I still have a few copies of this Report to spare, I shall be glad to post one to any person sending me his address with two-pence for carriage. It contains a full list of all the localities.



*R. Welch, Photo.*] Newcastle and Slieve Donard. *Belfast.*

Some of the fungi have been recorded in a "List of the Fungi of the North of Ireland," by H. W. Lett, published in the "Proceedings" of the Belfast Naturalists' Field Club, Appendix, 1884-85. And I may mention that Mr. W. West, of Bradford, Yorkshire, has, from time to time, examined squeezes and scrapings which I sent him from the Mournes, and furnished me with a list of the fresh-

water algæ, desmids and diatoms which he identified in my material. This I hope shortly to publish. On the present occasion, my remarks will be confined to the mosses and hepatics. As I use the nomenclature adopted in Dr. Braithwaite's "British Moss Flora," I shall omit the author's names.

The view of Slieve Donard, which is the highest mountain in Ulster, is reproduced, by permission, from a photo taken by Mr. R. Welch, of Belfast. It gives an excellent idea of the proximity of the mountain to the town of Newcastle and the sea, the great cairn on the summit being only three miles from the parish church. In the sand-dunes there is strong evidence of the presence of golfers, but passing through their links, the botanist will meet, among the mimic mountains of sand, with *Tortula ruralis*, var. *arenicola*, *Bryum proliferum*, *Mollia microstomum*, *Grimmia canescens*, *Climacium dendroides*, *Brachythecium albicans*, *Hypnum cordifolium* and *Pallavicina hibernica*. And at the extreme northern edge of the sand-hills inside the ruins of Dundrum Castle (which of itself is well worth a visit) will be found *Eurhynchium pumilum*. A little way up the Shimna River, not far from the railway station at Newcastle, have been found *Orthotrichum rivulare* and *Brachythecium velutinum*.

Near the centre of the village of Newcastle the road is cut through a black basaltic rock, one of the numerous dykes that traverse the Mournes. This is known to the villagers as "the Rock; and on the top of it stands the parish church of St. John, built by an Earl Annesley. On the sides of the rock cutting occurs *Mollia littoralis*. Following this route on past the ruinous harbour, the road skirts the sea, with Slieve Donard towering above. The rocks here produce *Grimmia maritima*, *Mollia inclinata*, *Hypnum cupressiforme*, var. *lacunosum*, and *Blindia acuta*. About a mile and a-half from Newcastle, on the old walls of the Bloody Bridge, I have gathered *Barbula brevifolia* and *Zygodon viridissimum*, var. *rupestre*.

After these preliminary rambles, attention will be turned to the mountains. The demesne of Donard Lodge, which runs round the base of Slieve Donard, is not very productive of either mosses or hepatics. In it, however, will be found *Bryum alpinum* as low down as one hundred and fifty feet. The higher parts of it, where the larch and Scotch-fir and spruce show by their stunted growth that they are on the verge of their region, are well worth searching, especially above the harbour, where I have found some rare plants, and in the neighbourhood of the ice-house.

The stream which bounds and slides down its rocky channel in this demesne is the White River. It can be followed for two miles up the glen, between Slieve Donard and Slieve Commedah, and at the upper end of it the adventurous will have an opportunity of exercising their skill in scrambling and climbing.

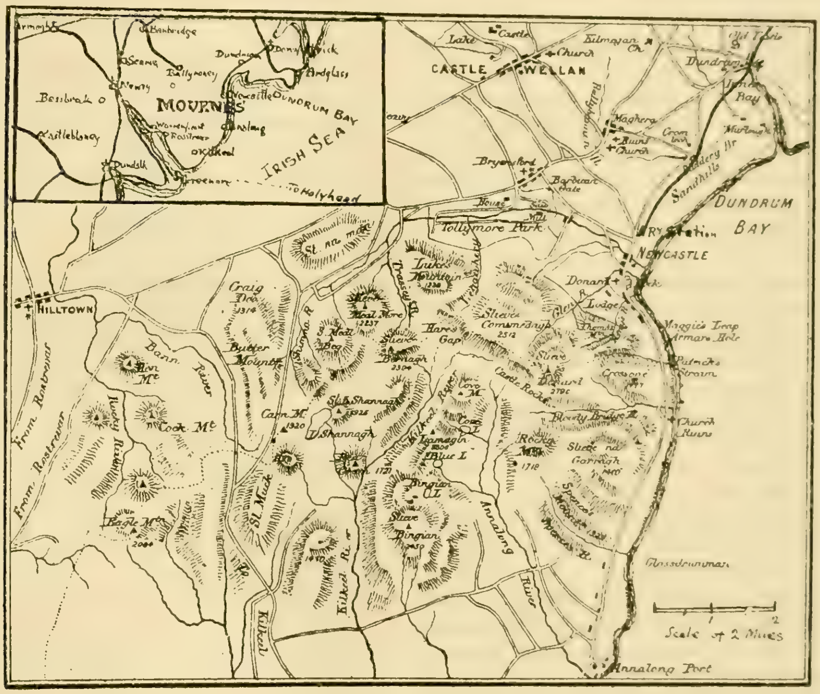
The streamlet which joins the White River close to the ice-house should be followed up to the rocks known as the Black-stairs. Here, after rain, there is a considerable waterfall in a narrow chasm. This and the surrounding rocks I have found to be the best moss-ground in the district. It faces the north, is protected from the sun's rays, and is always cool and more or less moist. Mosses and hepatics are everywhere, and on every stone and rock. From this locality the top of Slieve Donard is invisible, being shut off by the projecting shoulder, designated Thomas's Mountain, on the rocky face of which several rarities have been found. From Thomas's Mountain to the base of the cone of Slieve Donard is a stretch of boggy moorland where I met with many species that did not come under my notice elsewhere.

Moss-tramping in the Mournes, as the writer knows from the experience of twenty-five years, is the delightfully quiet work that a botanist enjoys. Although so close to Newcastle, Rosstrevor and Warrenpoint, when one gets a mile away into the heathery region one seldom, if ever, meets with a human being. There are no roads, except the one through the Deer's-meadow, no houses, no refreshment rooms, nothing to induce the mere noisy tripper. In all my rambles through these mountains I have not met (excepting the turf-makers in their season in the Deer's-meadow) more than three persons. One was a gentleman who was descending by the Black-stairs from Slieve Donard and suddenly came round a rock from the face of which I had just secured a moss, and still had my sailor's-knife open in my hand. He was so alarmed at suddenly meeting me, with the bare blade, that he took to his heels without a word, On another occasion, near Shanslieve, I was followed by a game-keeper, who, on coming up to me, watched my operations for some time till at last he scornfully remarked, "Why, it is only fog you are lifting"—fog being a local name for moss —and he left me to go on my way.

Though sheep-tracks are the only marked paths through the Mournes, there is no diffculty in making one's way anywhere through them. The accompanying map will be of some use for this purpose. Those who desire a better guide should procure the Ordnance Survey Maps of Ireland, scale of one inch to a mile, Sheets Nos. 60 and 61, price one shilling each.

The mosses and hepatics which I found on the Slieve Donard localities described above are as follows:—*Sphagnum acutifolium* and its vars. *purpureum*, *rubellum*, *luridum*, *arctum* and *versicolum*, *S. squarrosum* with var. *laetevirens*, *S. rigidum* and its var. *compactum*, *S. subsecundum*, also var. *contortum*, *S. papillosum*, *S. cymbifolium*; *Andreæa petrophila*

and vars. *acuminata* and *gracilis, A. alpina; Catharinea undulata; Oligotrichum incurvum; Polytrichum subrotundum, P. nanum*, var. *longisetum, P. aloides, P. urnigerum, P. alpinum, P. piliferum, P. juniperinum, P. strictum, P. commune; Fissidens bryoides, F. osmundioides, F. taxifolius, F. adiantoides; Leucobryum glaucum; Ditrichum homomallum; Dicranella heteromalla; Anisothecium squarrosum; Campylopus atrovirens, C. brevipilus, C. setifolius, C. fragilis, C. pyriformis, C. flexuosus; Dicranoweissia cirrata, Dircranum majus, D. bonjeani, D. scoparium*, with var. *orthophylla*, also its var. *alpestre; Dichodontium pellucidum; Onchophorus crispatus; Ceratodon* *B. pallens, B. ventricosum, B. filiforme; Mnium undulatum, M. hornum, M. punctatum; Hedwigia albicans; Neckera crispa; Pterigophyllum lucens; Heterocladium heteropterum; Thuidium tamariscinum; Isothecium myurum; Bachythecium rutabulum, B. rivulare, B. viride, B. plumosum; Eurhynchium myosuroides, E. swartzii; Hyocomium flagellare; Rhyncostegium tenellum, R. rusciforme; Plagiothecium denticulatum, P. borrerianum, P. sylvaticum, P. undulatum; Hypnum revolvens, H. uncinatum, H. filicinum, H. commutatum, H. falcatum, H. cupressiforme*, vars. *filiforme* and *ericetorum, H. molluscum, H. palustre, H. stellatum, H. sarmentosum, H.*




Map of the Mourne Mountains.

*purpureum; Mollia tenuirostris; M. verticillata, M. tortuosa; Leersia contorta; Webera sessilis; Grimmia pruinosa, G. pulvinata, G. decipiens* and var. *robusta, G. funalis, G. trichophylla, G. donnii, G. ovata, G. elliptica, G. acicularis, G. aquatica, G. microcarpa, G. heterosticha, G. obtusa, G. affine* and var. *gracilescens, G. fascicularis, G. hypnoides; Glyphomitrium daviesii, G. polyphyllum; Anoectangium mougeottii; Pleurozygodon compactum; Orthotrichum affine, O. diaphanum; Funaria hygrometrica, F. obtusa, F. templetoni; Tetraplodon bryoides; Bartramia pomiformis, B. fontana; Pohlia acuminata, P. elongata, P. nutans, P. cruda, P. annotina, P. albicans; Bryum inclinatum, B. bimum, B. alpinum, B. argenteum, B. capillare*, likewise var. *magus, cuspidatum, H. schreberi, H. purum; Hylocomium proliferum, H. squarrosum, H. loreum, H. triquetrum; Frullania dilatata, F. tamarisci; Lejeunia hamatifolia, L. ovata, L. serpyllifolia; Radula aquilegia; Anthelia julacea; Bazzania trilobata; Cephalozia bicuspidata; Saccogyna viticulosa; Cincinnulus argutus; Scapania undulata* with var. *purpurascens, S. nemorosa, S. resupinata, S. compacta; Diplophyllum albicans; Lophocolea bidentata; Colcochila taylori; Jungermania quinquedentata; Southbya obovata; Mesophylla compressa; Marsupella emarginata, M. sphacelata; Alicularia scalaris; Acolea crenulata, A. obtusa; Pellia epiphylla; Aneura pinguis; Conocephalus conicus; Marchantia polymorpha.*

*(To be continued.)*

# GENERIC NAMES OF DIATOMS.

By Rev. Adam Clarke Smith.

FROM my connection with the Postal Microscopical Society, I know that a number of persons are interested in and are working at Diatoms, that most fascinating subject. They are, however, unless classical scholars, sadly hampered in their study with the nomenclature. For the sake of an acquaintance, I have translated, as far as I could, the generic names, and thinking that the list might be useful to others, I have offered the result to Science-Gossip.

These generic names were generally given from fanciful resemblances; many are very happy, and help greatly to separate the class from others, but some are difficult to ferret out, or to perceive the resemblance. I have made out what I could; I have left the others as blanks, hoping that some readers may be able to hit the meanings; if so, I shall be very glad if they are sent to me that I may add them in some future number of this periodical.

It will be at once perceived that I have not taken proper names of individuals, such as *Kitton's*; that of itself would form an admirable memorial of some of our leading Diatomists and scientific men, whether alive or dead.

Some of my difficulties I have submitted to Mr. Grove and Mr. Nelson, but they seem as much puzzled as I am. Any one in London who has access to the library of the R.M.S. or to the University Libraries of Oxford and Cambridge, might discover the meaning, or the intention of the givers on first naming them.

The specific names are more easily to be made out, being mainly derived from the Latin; whereas the generic are generally Greek combinations, and sometimes are very fanciful.

The (*g*) after some words signifies that it is taken from the genitive case, as *actis*—a ray, genitive—*actinos*.

### Derivations of Generic Names of Diatomaceæ.

Achnanthes, sea-foam flower; achnè—sea-foam, and anthos—a flower.

Achnanthidium, a small Achnanthes.

Actiniscus, a rayed bag; actinos (*g*), and ascos—a bag or bottle.

Actinocyclus, a rayed circle; actinos (*g*), and cuclos—a circle.

Actinodiscus, a rayed disk; actinos (*g*), and discos—a disk.

Actinoptychus, folded rays; actinos (*g*), and ptuchos (*g*)—a fold.

Alloioneis, a differently-sided boat; alloios—different, and neis = naus—a ship.

Amphiprora, rounded prow; amphi—around, and prora—a prow.

Amphipleura, rounded sides; amphi, and pleura—a rib.

Amphitetras, four-sided; amphi, and tetras—four.

Amphora, a jar.

Anorthoneis, not an "Orthoneis."

Anthodiscus, a flowered disk; anthos—a flower, and discos.

Arachnoidiscus, the spider's-web disk; arachnè—a spider, and discos.

Asterolampra, a shining star; aster—a star, and lampros—shining.

Asteromphalus, a star in the centre; aster, and omphalos—the navel.

Auliscus, a small reed or pipe.

Bacillaria, small rods.

Bacteriastrum, a star with rods; bacterion—a rod, and astron—a star.

Campylodiscus, a saddle-shaped disk; campulos—bent, and discos.

Campyloneis, a bent boat; campulos—bent, and neis.

Cerataulos, horn tube; ceras—a horn, and aulos—a hollow.

Cestodiscus, a girdled disk; cestos—Venus's girdle, and discos.

Cheloniodiscus, a tortoise-shaped disk; chelonè—a tortoise, and discos.

Chœtoceros, a horned chest; coitè—a chest, and ceras.

Climacosphenia, a wedge-like ladder; climacos (*g*), and sphen—a wedge.

Cocconeis, a berry-like boat; coccos—a berry, and neis.

Colletonema, a filament of forms in mucus; colletos—glued, and nema—a filament.

Coscinodiscus, a sieve-like disk; coscinon—a sieve, and discos.

Cosmiodiscus, a well-ordered disk; cosmios—well-ordered, and discos.

Craspedodiscus, a bordered disk; craspedon—a border, and discos.

Craspedoporus, a bordered hole; craspedon, and poros—a hole.

Cyclotella, a small circle.

Cymatopleura, having swollen sides; cuma—the swell of the sea, and pleura—a rib.

Cymbella, a cymbal; cumbalon—a hollow basin.

Denticula, a small tooth.

Diatoma, brittle-wort ; dia—through, and temno—to cut.

Dicladia, double-branched ; dis—twice, and clados—a branch.

Dictyoneis, a netted boat ; dictuon—a net, and neis.

Dictyopyxis, a netted box ; dictuon, and puxis—a box.

Diploneis, a duplex boat ; diplos—double, and neis.

Encyonema, a pregnant filament ; encuos—pregnant, and nema.

Endictya, netted ; en—in, and dictuon—a net.

Entogonia, an angle inside another ; entos—within, and gonia—an angle.

Epithemia, a small lid.

Eucampia, well curved ; eu—well, and campè—a bending.

Eunotia, well-backed ; eu, and notos—the back.

Eunotogramma, well-backed writing ; eu, notos, and gramma—a letter.

Euphyllodium, beautiful leaf ; eu, and phullon—a leaf.

Eupodiscus, a distinctly-footed disk ; eu, and podos (*g*)—a foot, and discos.

Euodia, distinctly swollen ; eu, and oidos—a swelling. (If this be the right derivation, the word should be spelled Euœdia.)

Fenestrella, a small opening or window.

Fragilaria ; fragilis—brittle.

Gephyria, a small bridge ; gephura—a bridge.

Glyphodesmis, glupho—to carve, and desmis—a bundle ; or desmos—a fetter or chain.

Glyphodiscus, a carved disk ; glupho, and desmis or desmos, and discos.

Gomphonema, a filament of wedge-shaped forms ; gomphos—a wedge, and nema.

Goniothecium, a box with angles ; gonia—angle, and thecè—a box.

Grammatophora, bearing an inscription ; gramma, and phorus—bearing.

Gyrotychus, a round and folded form ; guros—round, and tuchos (*g*)—a fold.

Heliopelta, sun-shield ; helios—the sun, and pelta—a shield.

Hemiaulus, half a sheep-pen ; hemi—half, and aulis—a fold. (Like one side of a sheep-pen, such as we see on the Sussex Downs.) Or, aulos—a tube or pipe.

Hemidiscus, half a disk ; hemi, and discos.

Heterodictyon, a variable net ; heteros—different, and dictyon.

Himantidium, a small strap or thong.

Hyalodiscus, a transparent disk ; hualos—transparent, and discos.

Isthmia, a narrow neck.

Isodiscus, ; isos—equal, level ; and discos.

Lampriscus, lampros—shining, and ascos—a bottle.

Liradiscus, lily-disk ; leirion—a lily, and discos.

Licmophora, the fan-bearer ; licmos—a fan, and phoros.

Lithodesmium, ; lithos—a stone, and desmos.

Mastogloia, a nipple-like mucoid mass ; mastos—the breast, and gloios—glue.

Melosira, a filament of apple-like forms ; melon—an apple, and seira—a cord or filament.

Meridion, like the face of a clock ; meridion—noon-day.

Monopsia, having one eye ; monos—only, and opsis—eye-sight.

Navicula, a little boat.

Odontella, a little tooth ; odontos (*g*)—a tooth.

Odontidium, a little tooth ; odontos (*g*).

Omphalopelta, a shield with a centre ; omphalos, and pelta.

Orthoneis, a straight, symmetrical boat ; orthos—straight, and neis.

Orthosira, a straight chain ; orthos, and seira.

Paralia,

Parelion, like a mock-sun ; parelios—a parelion.

Peponia, a melon ; pepon.

Pinnularia, a small feather ; pinna—a feather.

Plagiogramma, inscription on the side ; plagios—sideways, and gramma.

Pleurosigma, with sides like the Greek Σ ; pleura, and sigma.

Podosira, a footed chain ; podos (*g*), and seira—alluding to the stalk, or stipes, by which the diatom is attached.

Podosphenia, a footed wedge ; same as podos in Podosira above, and sphen.

Porodiscus, a pierced disk ; poros—a passage, and discos.

Porpeia, a clasp, or buckle.

Pyrgodiscus, a disk with a tower ; purgos—a tower, and discos.

Pyxilla, a little box ; puxis.

Raphoneis, boat-shaped, with herring-bone markings ; raphè is the suture of the skull—herring-bone work ; hence raphis—a needle : hence it may mean the clear line separating the two opposite sets of markings.

Rhabdonema, a fillet of rods ; rhabdos—a rod, and nema.

Ripidophora, fan-bearing ; ripis—a fan, and phoros.

Rhizosolenia, ; riza—a root or stem, and solen—a pipe.

Rhoicosigma, a crooked letter Σ ; rhoicos—crooked, and sigma.

Rhoicosphenia, a crooked wedge ; rhoicos and sphen.

Rutilaria, a lovely folding ; rutis—a fold, and laros—lovely.

Sceptroneis, a sceptre-like boat ; sceptron—a sceptre, and neis.

SCHIZONEMA, a branching collection of boats; schizo—to divide, and nema.

SCOLIOPLEURA, with crooked sides; scolios—crooked, and pleura.

SKELETONEMA, ; skeletos—dried up, and nema.

STAURONEIS, a boat with a cross; stauros—a cross, and neis.

STEPHANODISCUS, a crowned disk; stephanos—a crown, and discos.

STEPHANOGONIA, an angular or pointed crown; stephanos, and gonia.

STEPHANOPYXIS, a crowned box; stephanos, and puxis.

STICTODISCUS, a spotted disk; stictos—spotted, and discos.

STRANGULONEMA, a constricted filament; strangos—a strangling, and nema. (The filaments are constricted deeply, as though tied with thread.)

STRIATELLA, a small ridge; stria.

SURIRELLA.

SYNDETONEIS, a boat bound in another; sundetos—bound together, and neis.

SYNEDRA, a joining together; sunedros—a sitting in council.

SYRINGIDIUM, like a shepherd's pipe; surinks—a pipe.

SYSTEPHANIA, ; sus—together, and stephanos.

TABELLARIA, a little tablet.

TERPSINÖE, heart-gladdening, *i.e.* musical.

TETRACYCLUS, of four circles; tetras—four, and cuclos.

THALASSIOSIRA, sea-filament; thalassa—the sea, and seira.

THALASSIOTHRIX, sea-hair; thalassa, and thrix—the hair.

THAUMATODISCUS, wonder-disk; thauma — a wonder, a juggle (called from the "thaumatrope," a child's toy), and discos.

THAUMATONEMA, wonder-filament; thauma, and nema.

TOXONIDIA, like a little bow; toxon—a bow.

TRICERATIUM, three-horned; tris—trice, and ceras.

TRINACRIA, three-pointed; tris, and acron—a point.

TROCHOSIRA, a wheel-like filament; trochos—a wheel, and seira.

TROPIDONEIS, a twisted boat; tropè—a twist, and neis.

TRYBLIONELLA, a little dish; trublion—a dish.

XANTHIOPYXIS.

ZYGOCEROS, a horned yoke; zugon—a yoke, and ceras.

I trust these explanations will interest some, and will help towards the understanding of these marvellous beauties of Nature.

*Eastmoor, Church Road, Bournemouth East; May, 1896.*

## EFFECT OF FEAR UPON HERONS.

IN a former number (SCIENCE-GOSSIP, Vol. ii., N.S., p. 194), a correspondent describes one of a flock of partridges flying over a railway train, falling dead, apparently from fright. One September, a few years since, I had an opportunity of testing a statement I had frequently heard made when shooting over Irish bogs, namely, that a heron, when fishing for eels or frogs in a ditch or bog-hole, becomes paralysed if surprised by a person suddenly appearing on the bank above him, and shouting or gesticulating violently; when they can be killed with sods or stones. On this occasion I was walking on a high bank bordering an estuary of a river running into Sheephaven, co. Donegal, in a gale of wind, and numerous herons, driven by the rising tide off the flats, were sheltering from the wind under it, and flying off from time to time almost from beneath my feet as I passed along. Suddenly I remembered the story of my gillies of days gone by, and resolved to put it to the test. Making a detour, I approached the shore further on where the bank was very steep and fringed with furze. On reaching the edge (for the high wind prevented my approach being heard) I saw a heron standing right beneath, and flapping my cloak and shouting, to my surprise it sat down and waited till I rushed down the bank. Shielding my face from its dangerous beak, I took it up and carried it to the field above. When put down it remained crouching in a sitting attitude on the ground watching me, and uttering occasionally a low croaking sound. When I went about ten yards off, it rose to its legs and walked deliberately to a furze bush and sat down under it. I then took it into the open field and threw it into the air as high as I could; it merely expanded its wings and pitched again and sat down. Taking it to the shore I retired, and then it waded out till the waves lifted it off its feet, when to my surprise it paddled manfully against them for a while, but the wind drove it back. After some fifteen or twenty minutes of my rather cruel experiments, I left it where I found it, apparently paralysed with terror, but unhurt. It could spread its wings and the wing-bones were sound, and it was apparently uninjured in any way. Judging from the top-knot it was a young bird, but not of that year.

W. F. DE V. KANE.

*Drumreaske House, Monaghan.*

WE have received from Mr. R, Kanthack, 18, Berners Street, London, W., illustrated priced catalogues of astronomical and physical instruments made by C. A. Steinheil Söhne, of Munich. These catalogues are sent free, on application, to those interested.

# SCIENCE AT THE NATIONAL PORTRAIT GALLERY.

By John T. Carrington.

(*Continued from page* 5.)

## Sir Richard Owen (1804-1892).

THREE decades since, the name of Professor Owen was frequently before the public. Many wondrous things were attributed to his knowledge of anatomy and animal structure. Those times were towards the end of the days when the term "naturalist" was associated with museum specimens, and before the word "biologist" for the time being drove it out of fashion.

Richard Owen was born in a house at the junction of Brock and Thurnham Streets, in Lancaster, on the 20th of July, 1804. His father was a West India merchant, of Fulmer Place, Buckinghamshire, where his grandfather had lived and acted as High Sheriff of the county. Owen's mother was a Lancashire woman of Huguenot origin. Richard Owen's first experience of school was at the grammar school at Lancaster, where he went at the early age of six years. There he met, as schoolfellow, William Whewell, in later years a well-known writer on scientific subjects and the unfortunate inventor of the abominable word "scientist." At school Owen never showed any brilliancy or taste for natural history, heraldry being rather to his bent, if he had any.

In 1820, Owen was apprenticed to a surgeon-apothecary of Lancaster, his indentures being transferred to two other surgeons before his time expired. Under the last of these masters he had to attend the county gaol to conduct post-mortem examinations, in which he soon became much interested, developing a passion for anatomy. On leaving Lancaster, he entered the University of Edinburgh and attended, among other studies, the lectures on anatomy by Dr. John Barclay, who, though not the University professor of anatomy, was a man of great ability and reputation. To his excellence in teaching comparative anatomy Owen always attributed, in after life, his great success. Without waiting to take his degree, Owen, in 1825, removed to St. Bartholomew's Hospital in London, where he went the bearer of a letter of introduction from Barclay to the noted Dr. Abernethy, who appointed him Prosector for his surgical lectures. In 1826 he passed for his Fellowship of the Royal College of Surgeons, and set up in private practice at 11, Took's Court, Carey Street, Lincoln's Inn Fields. In 1827 he received, through Abernethy's influence, the post of Assistant Keeper of the Hunterian Museum of the Royal College of Surgeons, under William Clift, a devoted pupil and assistant of Dr. John Hunter. He it was who had lovingly cared for these collections from the time of the great surgeon's death until they came under the custody of the Royal College. In 1829 Owen was appointed

Sir Richard Owen.

Lecturer on Comparative Anatomy at St. Bartholomew's. At the Hunterian Museum he met Cuvier, and on his invitation went, in 1831, to Paris, where Owen attended the lectures of Cuvier and Geoffroy St. Hilaire, and worked in the dissecting rooms of that city. His first published paper appeared in "The Transactions of the Medico-Chirurgical Society," in 1830. In 1832 his "Memoir on the Pearly Nautilus" founded his reputation, and in 1834 he became F.R.S. In 1833 he founded the "Zoological Magazine," but he soon severed his connection with it. For some seven years he had been engaged to Caroline Clift, the only daughter of his friend and chief at the Museum, but it was not until 1835 that his prospects admitted of their marriage. In 1842 he was made joint Conservator with Clift, who soon afterwards retired, when Owen became wholly responsible, with J. T. Quekett as his assistant.

In 1836 Owen was appointed first Hunterian Professor of Comparative Anatomy and Physiology at the Royal College of Surgeons. Honours then began to fall fast upon him, including a civil list pension of £200 per annum, granted by Sir Robert Peel; and about that time it is said he refused a knighthood.

Up to 1852, from his appointment as Curator of the Royal College of Surgeons, he had occupied small rooms in the College buildings; in that year, however, the Queen gave him the use of the cottage named Sheen Lodge, in Richmond Park, where he resided until his death. In 1853, Owen took his wife to Paris, and lectured in French at the Institute. Later, on his connection with the British Department of the Universal Exhibition, Napoleon III. created him a Knight of the Legion of Honour. This was not his first association with an exhibition, for he was a member of the Organising Committee of the Great Exhibition of 1851, and was destined to be later occupied at the building on its removal to Sydenham, where he suggested and carried out the design for the models of extinct animals still to be seen in the grounds at the Crystal Palace.

In 1856, he was appointed to the specially created post of Superintendent of the Natural History Department of the British Museum. Previously the collections had been in charge of the principal librarian. The permanent staff at the Museum having hitherto been in a very independent position, continued their work much in their own way, leaving the administrative work for Owen of the smallest. Instead of resenting this, he quietly settled down, free from financial anxiety, his salary being £800 a year, to study the vast material in the Museum, and his publications became most voluminous, though we doubt their great value for future generations.

Owen was a man of strong views in some directions, and in him Charles Darwin found a steady opponent to his theory of natural selection as the origin of species; Owen following his courtier's instinct in supporting the orthodox view of special creation.

Richard Owen's most useful work in his connection with the British Museum was his persistent application to the Government for more space for the collections than was available at Bloomsbury. In this he was well supported by the heads of the department, but it was not until 1881 that the new museum at South Kensington was open to the public, though he commenced his agitation in 1859. In 1883, his health had become a source of anxiety to his friends, and being in his eightieth year, at his own desire he resigned his position at the Natural History Museum, in which he was succeeded by the present director, Sir William Flower, K.C.B., F.R.S. In 1884, Owen was made a Knight Commander of the Bath, and his annual pension was augmented. He survived until 1892, when he died and was buried in the churchyard at Ham, near Richmond, where his wife had preceded him in 1873.

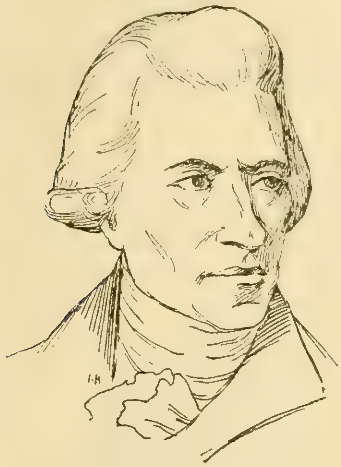
It would be hardly in place in these sketches of scientific worthies to criticise Sir Richard Owen as a man of science. He was eccentric from some points of view, and a link between the old times and the new. He never fully appreciated the new, but clung tenaciously to the old. As an example of what we mean, we have only to compare what we remember of the natural-history department at Bloomsbury, with the magnificent galleries as now arranged at Cromwell Road, Kensington.

The portrait of Sir Richard Owen hangs in Room XVII. of the Gallery. It was painted by H. W. Pickersgill, R.A., and represents Professor Owen in his academic gown holding in his left hand a nautilus shell. The portrait is about half life-size, at middle age, showing the black hair and large black eyes which were so characteristic of his face. He changed considerably in later years, growing more massive in his features.

### Sir William Herschel (1738-1822).

There are two pictures of this celebrated astronomer in the National Portrait Gallery, one in oil colours at the age of fifty years, the other in pencil. The former is about two-thirds life size, by Lemuel F. Abbot. It was purchased for the Gallery in 1860. He is represented simply by head and shoulders, dressed in a rich purple brown coat and wearing white stock and frilled shirt. His hair is grey, full at the back, and may have been a wig, though it is drawn as though natural. The pencil sketch is by Sir Thomas Lawrence, P.R.A., and was purchased in May, 1891. It represents Sir William at an apparently earlier age than the oil-painting, as his face is far less full.

Frederick William Herschel was born in Hanover, November 15th, 1738, of Protestant parents. His first Christian name was seldom used, and he was generally known as William Herschel only. His ancestors were long employed about the Hanoverian Court in various capacities, either in the gardens, or chiefly in the bands of music attached



SIR WILLIAM HERSCHEL.

to the regiment of Guards. William was engaged as hautboy player, but his health becoming shaken, he was made to desert his regiment by his parents, who shipped him off to England. Here he had a hard struggle for existence for the first three years of his residence, but fortunately he got the appointment of bandmaster of the Durham Militia, after which he became a music teacher at Doncaster, and conducted concerts in other parts of Yorkshire. In 1765 he was organist at Halifax, whence he went to Bath in the same capacity. There he studied harmony and mathematics after many a day of sixteen hours' teaching. This led on to astronomy, and he hired a small reflector from a quaker optician. With his brother's help, and some tools, in 1773 he set up his first telescope, and on March 4th, 1774, observed the nebula of Orion, a record of which is preserved by the Royal Society.

From that time, by slow and laborious work, he steadily made his way as an astronomical observer, until the jointure he received with his wife, on their marriage in 1788, left him free for greater work.

Herschel was a man in every way to be admired, gentle, cultured, earnest and painstaking in everything he undertook. Full of simplicity and kindness, he was ever ready to help others. His fidelity in friendship was notorious. It is related that in the midst of his busy life in Bath he left everything to search for a younger brother who had run away from home.

At last there came the great necessity of those times, royal favour; it included, by the way, free pardon for his deserting the regiment of Guards and a Knighthood of the Royal Guelphic Order of Hanover. It is impossible here to enumerate all the astronomical achievements of Herschel—it would occupy pages; the titles alone fill sixty-nine pages in the memoirs published by the Royal Society. He was virtually the founder of sidereal science, and he left records of 2,500 nebulæ, whereas 103 were only known on his taking up the study of astronomy. All he did was with the aid of simple instruments slung on a scaffolding mounted on circular rails. He never possessed a transit instrument, nor an equatorial. He it was who first indicated the association of sun-spots and terrestrial weather, pointing out that the price of wheat rose when the spots were scarce. He died of bilious fever, 25th August, 1822, in his eighty-fourth year, and was buried at Slough.

His only child, Sir John William Herschel (1792-1871) the first baronet, followed the path so ably directed by his father, with the advantage of improved instruments and the augmented knowledge of both generations. He was unsurpassed as an observer.

## DR. EDWARD JENNER (1749-1823).

Edward Jenner is better known to the world as a medical man than an exponent of any branch of natural science. He it was who first practically

DR. EDWARD JENNER.

applied what is now known as bacteriology to the alleviation of human suffering—for such was, unknown to himself, the discovery of vaccination as a preventive of smallpox.

Edward Jenner was born at Berkeley, in Gloucestershire, where his father was vicar, on May 17th, 1749. His mother's father had also been

vicar there. His first school was at Wotton-under-Edge, and later he was removed to Cirencester. There he developed an active taste for natural history, collecting plants, insects and fossils. On leaving school he was apprenticed to a surgeon at Sodbury; and in 1770 he joined the famed medical school of Dr. John Hunter, in London. There he showed his considerable capacity for true scientific investigation, apart from collecting. Hunter took much interest in his pupil, and carefully directed his studies; he introduced him to Sir Joseph Banks, whose material, collected on Cook's voyage, Jenner overhauled and assisted in preparing for museum purposes. In 1773 he returned to Berkeley and commenced practice as a surgeon. There he continued his studies of the local natural history. In 1788 he was elected a Fellow of the Royal Society. He became locally fashionable, partly on account of the care bestowed on his personal appearance, as well as for his professional ability; so in 1792 he took his M.D. degree at St. Andrew's, and gave up surgery.

About the end of the eighteenth century, Jenner continued his investigations systematically into the influence of cow-pox upon smallpox in human beings. After much correspondence with Dr. John Hunter, he, on May 14th, 1796, vaccinated James Phipps, a boy of eight years old, with lymph taken from a pustule of cow-pox on the hand of Sarah Nelmes. The boy had cow-pox, and on the 1st July following, the boy was inoculated with the virus of smallpox, which did not take. Jenner's notes and manuscript description of this experiment, though never published, is treasured at the Royal College of Surgeons.

Dr. Jenner spent some months of the summer of 1798 in London, where he tried in vain to get some one to be vaccinated. A month or so after he left, however, Dr. Cline, of St. Thomas's Hospital, vaccinated several patients with lymph given him by Jenner. Then followed much opposition from the medical profession, and a long course of further experiments by Jenner. The practice slowly made its own way. To read of its tardy but steady adoption by the people and the medical profession is most instructive in view of what is taking place in other directions at the present time—the mistakes that were made, the ignorant and wilful misapplication of smallpox virus to bring discredit on the new discovery; then the period of success, the honours and presents showered upon Jenner, including a grant from Parliament of no less than £10,000, which was followed by another grant of £20,000 in 1806. His wife died in 1815 at Cheltenham, where he practised as well as at Berkeley; but he soon after retired to the latter village, where he resided until he died on 26th January, 1823, in a fit of apoplexy. Jenner was buried in the chancel of the parish church, his house having adjoined the churchyard.

Sir Thomas Lawrence painted a portrait of Dr. Jenner; but that in the Gallery, of which a sketch is given here, is by James Northcote. It was engraved in stipple by Ridley in 1804. A marble statue is his memorial in Gloucester Cathedral; one in bronze is in Kensington Gardens, whither it was removed from Trafalgar Square, whilst portraits of him on the Continent include a statue in bronze at Boulogne-sur-Mer.

### Sir John Richardson (1787-1865).

The present generation of biologists is apt to forget the services of their ancestors in the world of science. Few people are heard to discuss such men as Dr. John Richardson, who in his time

Sir John Richardson.

added much to the knowledge of the animals and plants of Arctic regions. He was an eminent voyager, physician and naturalist, who was born at Dumfries in 1787.

After passing a medical course at Edinburgh, he joined the Navy as ship's doctor, and saw service at Copenhagen, and other engagements. He then returned to his medical studies, and in 1816 graduated M.D. at Edinburgh. In 1819, he volunteered into the service of Captain John Franklin as surgeon and naturalist on Sir John Franklin's first overland expedition. He again sailed with Sir John in 1825 in the same capacity, and conducted a separate exploring party on that occasion along the coast of the Arctic Sea, between the Mackenzie and Coppermine Rivers. On his return he contributed much valuable scientific information on subjects which were little understood. He was one

of the first scientific botanists who visited the high North-West of Canada, and many of his records adorn the list of plants of that magnificent botanical region. The writer of these notes had the pleasure, in 1894, of discovering one handsome plant there, which does not appear to have been recorded since Sir John visited the district further north with his exploring party.

Richardson's literary remains are considerable, perhaps the most important being "Fauna Boreale-Americana." He was a C.B., F.R.S., Inspector of Naval Hospitals, and a physician to the Fleet. He was knighted in 1846, and in 1848 sailed in search of his great friend, Sir John Franklin. He died, universally admired by those who knew him, and beloved by his friends, in 1865, at Lancrigg, near Grasmere, where he spent in retirement the last ten years of his life. The portrait is one by Pearce, who painted a series of Arctic explorers for Lady Franklin, who presented the pictures to the National Portrait Gallery.

*(To be continued.)*

## A FIRE-PROOF TREE.

By G. Clarke Nuttall, B.Sc.

THE wonderful adaptability which a living organism can show to an apparently hostile environment has been a matter of remark times without end. Again and again we have been struck by the presence of life where we should least have looked for it, and have been surprised by the marvellous way in which certain forms of life can become modified to enable them to grapple successfully with new contingencies. Indeed, this adaptability to environment is the sign proper of life, and on it alone has it been found possible to frame a satisfactory definition of the term itself.

A new and striking instance of this power of adaptation has recently been brought into notice by a Government report issuing from Colombia, the north-west corner of South America. Writing from Santa Fé de Bogata, the chief town, Mr. Robert Thomson draws attention to a native tree which is capable of withstanding the action of fire to a most remarkable degree; indeed, it apparently prefers to be exposed to it, for it actually thrives better when it has been "under fire." This quality enables it to live where other trees perish, as the following will show. A great part of Colombia and the north of South America generally consists of level plains almost interminable in extent, known as llanos or savannas, and estimated to cover nearly three hundred thousand square miles, an area more than three times as large as the whole of Great Britain. Here and there at long intervals low hillocks or mesas break the monotony of the plain, but so little are the inequalities of the surface that the llanos have often been likened to a sea of land. During the dry seasons of the year they become veritable deserts of dried-up vegetation and burning sand; the wild animals sustain life with the greatest difficulty, and the parched earth cracks into deep fissures. With the advent of the rainy season Nature revives: the plains spring into life—both animal and vegetable, the waters pour down, the rivers swell, and soon what had been a desert becomes a lake of rolling waters over which boats may pass for miles. Animal life suffers almost as much then from the too great abundance of water as it previously did from the drought. When the waters subside in October they are followed by a paradise of fresh green vegetation, which springs up into maturity almost like magic; and the inhabitants of the plains, the Llaneros, come down from the low hills where they had retreated during the flood, driving down with them their vast herds and flocks to feed on the juicy pasturage. For a time all is well, but gradually the sun sucks up the moisture, the vegetation withers and then dies, and the drought again settles on the land. The herdsmen are accustomed at this time, when everything is as dry as tinder, to set fire to the heated grass, so that when the rains come a new growth shall spring up unhampered by profitless remains of a past season.

These savanna fires, miles in extent, sweep over the plains with devastating fury, destroying all in their path, and leaving behind them only a track of blackened ashes, which ashes, though giving back to the soil the elements which the plants took from it, do not enrich it to the same degree as would accumulations of leaf-mould formed from decaying vegetation. What is a gain in utility as far as pasturage is concerned is a loss in other ways, for the fire entirely checks the growth of trees or shrubs, and the land is bare of vegetation beyond the yearly yield of grass.

One tree alone stands out a solitary and striking exception to the havoc wrought by the flames. It refuses to go under in the general devastation, and so well has it known how to protect itself, that the fire leaves it unscathed; nay more, it has made the best of its lot, and bends the very flames to its service. Locally this tree is known as Chaparro, botanically it is classified as *Rhopala obovata*. It belongs to a genus of trees and shrubs, most of which are also natives of South America. Its

appearance is much what we should expect from one whose whole development has been a struggle against desperate odds. It is dwarfed in stature, rarely exceeding twenty feet in height, and its stunted trunk does not measure more than a foot in diameter. Its rugged branches are twisted and bent into grotesque shapes, which speak plainly of a mute, sullen resistance. The leaves clothing the branches are course, rough, and hard in texture. The flowers grow in small spikes, insignificant and without beauty; they have no need to appeal to the eye of either man or beast. Each flower produces two seeds in a leathery pod-like case; the whole tree is built on a resistant plan. Each seed is a flat oblong, and has attached to it a membranous wing. The flowers develop after the rainy season, and the seeds mature during the great drought. When the fires rush over the plains the pods have burst, and the hot currents of air catch up the little winged seeds and carry them along, scattering them far and wide, Thus the tree effects its aim—the dispersal of its seeds through the agency of the flames, and the short exposure to the heat does not injure their dry tough nature. The presence of wings in seeds which rely on the wind as a carrier is not at all uncommon; the pine, for instance, provides its seed with a comparatively large wing, and pine-seeds are often carried great distances. When the chaparro seeds germinate they are found to have been scattered in wonderful order and without crowding, a result probably due to some regularity of the flame currents, and the plantations that form are most noticeable for the systematic arrangement of the trees; in fact, they have every appearance of having been planted and kept by man's agency. This is a fact which strikes particularly on the attention, for so often where nature is left to herself, we have terrible overcrowding and a most desperate battle for the survival of the fittest.

Why is this tree so remarkably adapted for the fight with fire? The secret lies in the peculiar bark which covers it like a skin. Bark arises on trees from the dried-up outermost tissues of the stem being rejected and pushed off, as the stem, in its natural course of growth, forms new tissue from within. In no trees has the outer portion of the bark any organic function; when retained it always serves a purely protective purpose. In the chaparro this outer bark to the thickness of about half an inch, is arranged in loose layers, and it has become thickened and modified to such a degree that the protection against ordinary dangers is extended to the case of fire. In addition to being practically fire-proof, its arrangement in the loose layers renders it a non-conductor of heat, and therefore the delicate inner tissues of the tree remain unharmed during the scorching but brief onslaught of the savanna fire.

The home of the chaparro is emphatically these fire-swept plains. In Colombia its plantations cover vast areas; they are found touching the sea-coast on the north, and again a thousand miles inland; they may be on the level plain or high up on the surrounding hills at an elevation of a thousand feet or more. It is at a disadvantage, however, in situations where other trees can live; it can defy the fire, but it succumbs in a struggle for existence with others of its kind. All its energy appears to have gone in the fight with its one particular foe.

The natives of Tolima, one of the United States of Colombia, credit the chaparro with yet another virtue. They assert that it will only grow where there is gold in the soil below, and that, therefore, it serves as a true guide to the seeker after riches. This belief, however, rests at present only on tradition, for though it undoubtedly grows in auriferous regions, it has yet to be proved that it grows in no others.

This humble fire-proof tree is bestowing great benefit on the land, and is slowly improving it. The plantations are a protection against the fierce rays of the sun, for under their shelter it is not possible for the land to be so parched; moreover, they attract what little moisture there is in the air, and so the chaparro plantations, during the dry season, almost play the part of oases in the desert. Mr. Thomson points out that the chaparro's work in the amelioration of the land might easily be accelerated and extended were man to step in and assist nature by a "few simple devices."

The chaparro is not the only tree which can resist, to a very great extent, the action of fire, though, probably, to no other is the fire so congenial, and, therefore, it may be fairly claimed as the "king of fire-proof trees." Certain euphorbia trees, close allies of the chaparro, have been noticed in Africa to survive the grass-fires with only a few scorches. It was surmised that here too the secret of their immunity lay in their bark, and specimens were submitted to Professor Farmer for examination. His report confirmed this idea. In it he states that all pieces submitted "agree in possessing cells which show a certain amount of gummy degeneration of the cells in the bark, together with the presence of a considerable amount of sclerotic cells"; and his conclusion is that "it seems not impossible that these two facts may be connected with the resistance of the plants to the fire."

1, *Charles Street, Leicester; May*, 1896.

M. A. HERMANN, of 8, Rue de la Sorbonne, Paris, has sent us his catalogue of botanical and zoological books, comprising works in all languages, which occupies seventy-eight pages, varying in price from ninepence to fifty pounds. This will be found useful to many of our readers, as titles appear that are not often seen in English catalogues.

## UTILITY OF ENGLISH NAMES.

IT was the custom of a lovable humourist, now unhappily, no longer with us, to clearly indicate when he intended his remarks to be considered as a joke. In case of any possible misunderstanding on the part of some who may read these lines, they are intended 'to be so writ.' It has occurred to me that during the transition period through which we appear to be passing, whilst our lepidopterologists are extricating themselves from the delightful chaos they are bringing about our ears in the scientific names of some very common butterflies and moths, we humble outsiders might do worse than revert to the time of Moses Harris and whisper about the 'Queen of Spain,' the 'Emperor,' the 'Duke of Burgundy,' the 'Painted Lady,' or the 'Mourning Cloak,' and other eminent butterfly personages. These names are dreadfully unscientific, but they remain intelligible to some of those people who sign as an affix to their names the letters F.E.S., meaning in this instance 'fellows easily satisfied.' I am told it is expected by some of these F.E.S. that the time will come when there will be uniformity among lepidopterologists with regard to nomenclature. In the interval it is rather trying to the nerves of those who have, at 'much labour and expense,' acquired some four thousand learned names for British butterflies and moths, including genera—which, fortunately, we rarely think necessary to use—to find in every new book and monthly magazine an unfamiliar name, either generic or specific, for, say, our old friend the 'Admiral' or 'Admirable' butterfly. By the way that suggests even English names to be a little uncertain. What *are* we to do? Suppose there be formed a Committee to give entirely new names all round to everything on the principle of 'rub out and begin again.' For the present that goodly company might consist of Messrs. Tutt, F.E.S., South, F.E.S., W. F. Kirby, F.E.S., and Meyrick, 'with power to add to their number.' I feel sure such a Committee would work most harmoniously, and soon build up an entirely new scheme of nomenclature. If, unfortunately, friction did arise, 'the power to add' would soon provide an arbitrator, even if he were brought all the way from America, where unity exists—even if only in States and not in scientific nomenclature.

When we come to review this question, as it has extended over the past thirty years, the results seem to be most discouraging. The whole point of it appears to rest upon the question of priority. One would not have imagined that it could have taken the critical entomologists thirty years to have unearthed, searched through, and generally collated, the published authorities for first names of butterflies and moths attached to descriptions which are recognizable. JOHN T. CARRINGTON.

## AQUATIC HYMENOPTERA.

By FRED. ENOCK, F.L.S., F.E.S.

SINCE my last communication concerning these insects (SCIENCE-GOSSIP, June. page 11), I have, after very many fruitless journeys, at last been successful in capturing a few specimens of the strange Hymenopteron, *Prestwichia aquatica*, which Sir John Lubbock first found (and christened) in 1862, when he observed six swimming about in a basin of water taken from a pond at Chislehurst. Mine were accompanied by twenty-one *Caraphractus cinctus*, Haliday (= *Polynema natans* Lubbock), which were flying about or swimming with their wings under water, *Prestwichia* using its *legs* for perambulating about. Such a slice of luck, I imagine, has never before fallen to the lot of any entomologist, and I can only account for it in this way, viz., that upon the weed taken from the pond was a cluster of eggs of some aquatic insect, from which these parasites emerged.

I kept my specimens alive for three or four days, and noted how industriously they searched the weed, "sounding" with their antennæ every leaf and stalk for the right egg, but found it not.

I have also found one or two *Caraphractus cinctus* in three different ponds widely apart. The secret of success in finding these creatures is a very large amount of patience and luck, for my request to the "Quekett Pondists" has already born fruit, as on May 30th, on the occasion of the club's fortnightly field-day, one of the members, Mr. D. J. Scourfield, dipped a fine female *Prestwichia aquatica*.

The male still remains unknown; this I am not surprised at, for of some of these minute terrestrial Hymenoptera I have swept up hundreds of one kind —in one instance over six hundred, every one a female. No doubt the male is of a modest and retiring habit, or perhaps apterous, and does not wander away from the eggs out of which his partner will emerge.

As both of these aquatic insects are now proved to be double-brooded, we have every reason to hope that ere long we may have the pleasure of introducing the male.

The great heat which we are now experiencing is most favourable to the development of these minute parasites, many of the terrestrial species are partial to crawling up windows and greenhouses facing east. In such places, it is an easy matter to brush them into a phial of spirits of wine in which they are well-preserved, though some of the more delicate ones are apt to collapse. The art of setting out the antennæ, legs and wings is only to be learned after endless failures, but the insight we obtain into every detail of the marvellous structure of these atoms of perfection fully compensates for the time spent.

*21, Manor Gardens, Holloway, N.; June 13th, 1896.*

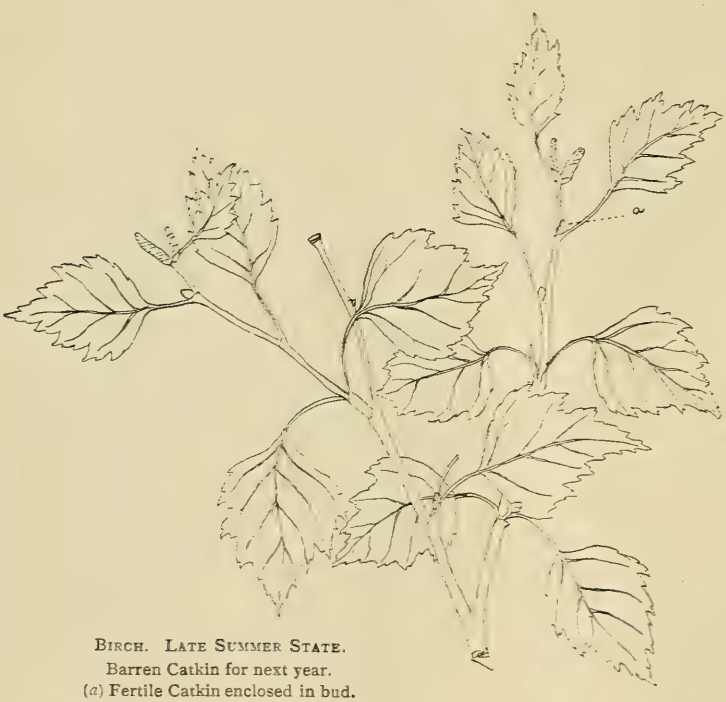
# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*Continued from page* 16.)

## The Birch.

In its early life, especially when vigorous, the birch (*Betula alba*, Linn.) is often of bushy growth, moderately stiff twigs arising from each node or joining, and showing little tendency to become pendulous. Gradually, as the stem and branches increase in length and as the twigs produced are less thick and robust than at first, these latter assume more of the pendulous character which gives so much elegance to the tree and which has earned for it the title of "Lady of the Wood."



Birch. Late Summer State.
Barren Catkin for next year.
(*a*) Fertile Catkin enclosed in bud.

The arrangement of the leaves in the birch is not two-ranked as in the elm and beech, but is a spiral, whose fourth leaf ranges over the first, and thus each leaf and consequently its resulting leaf-bud or shoot, diverges from its nearest neighbour, whether above or below, at an angle of 120 degrees, *i.e.* one-third of the circumference of the stem; thus the twigs or branches arise at more uniform angular distances around the stem than where the arrangement is two-ranked, although the internodes which separate them is often considerable.

As to the position of the flowers. The birch is monœcious, *i.e.* the staminate and pistillate flowers are produced by the same individual tree, but grouped in separate catkins as in the beech. The barren or staminate catkins are terminal, formed towards the close of each summer at the tip of the yearly shoot. They have no protecting bud-scales, and they continue exposed through the winter ready to expand in the following spring. At first sight the catkin or group of catkins seems to be lateral and opposite to the uppermost leaf, but on examination it is seen that although turned towards one side it is really terminal, its stalk being the true continuation of the axis. This turning to one side allows the uppermost axillary bud to stand at the tip of the shoot and to perform the office of growing point; hence the shoot to which it gives rise in the next season is continuous in direction with the previous growths.

The fertile or pistillate catkins, on the other hand, are lateral, and are enclosed in axillary buds, the scales of which do not unfold and disclose the young catkin to view until the following spring, at which time the barren catkins also open. These winter-buds are formed in the axils of leaves somewhat low down the year's shoot.

The pistillate catkin, with its stalk, is really the axis of a spur or short shoot with undeveloped internodes, as is seen by the two or three leaves at the base of the catkin stalk. In the axil of one or more of these leaves buds are formed which, in another season, continue the growth of the spur and produce other pistillate catkins. After some seasons, however, these spurs gradually die off and leave those portions of the branches bare. The buds which give rise to leafy growth generally arise from the axils of the upper leaves of the shoot, and thus in the full-grown birch the branches are bare in their lower portion, but terminate in tufts of lengthened drooping twigs. The angle which the branches make with the parent stem or branch is

ess than forty-five degrees, and the twigs, which at first are slender and pendulous, often gradually raise themselves as their age increases and eventually follow the same line as the other parts of the branch.

Thus, then, in the birch we have a tree with erect


BIRCH. SPRING STATE. *a*, Barren Catkin; *b*, Fertile Catkin.

main stem, whose branches ascend at less than half a right-angle, often bare in their lower portion, but towards their extremities dividing into a number of subordinate branches, each of which bears its tuft of graceful pendulous twigs.

(*To be continued.*)

## NEW BUTTERFLIES IN THE CANARY ISLANDS.

By A. H. BECHERVAISE.

IN the October issue of SCIENCE-GOSSIP (vol. ii., page 207), I gave a short account of the butterflies of these islands, in which I said, "It is a curious fact that the almost ubiquitous mimicker of the Danaidæ, *Diadema misippus*, has not followed them to the Canary Islands."

At about the same time that the above remark appeared in print, *D. misippus* put in an appearance in this island. Several specimens were taken at Orotava, and one near my house at Santa Cruz, by a lady who unfortunately killed it before I could plead for its life. So far as I know, all the specimens taken at Orotava were also killed by the acquisitive capturers. It seems a great pity not to give this beautiful insect a chance to establish itself here. They are bold and friendly insects, and often accompany and hover round one in the most familiar manner. I particularly remember the charm their presence lent to many a walking and shooting excursion in lower latitudes.

A communication in the December number of "Nature" notices the appearance of *D. misippus* in Teneriffe, and the writer, in announcing the capture of two specimens at Orotava, says "they were in such fine condition that they must have been introduced in the larval or pupal state, and emerged there." I see no reason for such supposition. Throughout last summer, instead of the usual north-east trade winds, a long period of southerly and south-easterly winds prevailed, and the original visitors were most probably wind borne from either the Cape Verd Islands or the adjacent African coast, where they are numerous. Their food-plants being plentiful here, fresh specimens would soon result.

A few days ago I received a letter from a careful entomologist in England, in which he tells me that a young collector, who was here recently for a few weeks on his return to England, showed his captures to my correspondent for identification. He is acquainted with the Rhopalocera of the Canary Islands, and was surprised to find amongst them specimens of *Arge galathea* and *Argynnis aglaia*. These are stated to have been taken, both on the same day (Good Friday), in a rocky, treeless ravine near Santa Cruz. I have made enquiry, but can hear of no other specimens of these species having been captured or seen in this island, and consider that further confirmation is necessary before admitting their immigration. However, should their presence be established, it will further confirm the fact mentioned in my article of October last, that "the butterflies of the Canary Islands appear to have a direct relationship with those of North Europe, and not those of West Africa, as might be expected."

*Santa Cruz, Teneriffe; May, 1896.*

TEAL NESTING IN WORCESTERSHIRE.—It may interest some of your readers to know that on June 11th, I saw here a teal's nest containing ten eggs, much incubated. Four years ago a brood of eight were hatched out in the same neighbourhood.—*Rev. K. A. Deakin, Cofton Hackett, Worcestershire.*

## NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

As my last article was on *Hydra fusca*, I will put in a few notes as to further experience of them since last writing. On February 19th, *Hydra* No. 2 had fastened on a large *Daphnia shefferii* which evidently contained eggs; to swallow such a large *bonne bouche* the mouth of the *Hydra* was enormously enlarged and the edge resembled the convolution of a convolvulus flower. Later in the day the *Hydra* had swallowed the *Daphnia*, but was greatly distended, the shape of the water-flea being plainly discernable inside, and the body of *Hydra* nearly transparent. Now since that I have seen some of my other *Hydra* feeding, notably on the occasion of *Hydra* No. 2 making such a "square meal," as the Yankees say; she presented a much darker appearance, a sort of chocolate brown. She actually began to bud on February 20th; the next day the bud had tentacles. On February 23rd a second bud formed, and mother and buds were a dark colour contrasted to the other *Hydra* in the same glass, who were cream colour. This may be taken as an evidence of the effect of a good diet.

Another observation is that every *Anacharis* leaf (the favourite *Hydra* weed, apparently) gradually loses all chlorophyll, or green matter of its leaves, which become a yellow tissue. Even the stalks, where *Hydra* has long been attached, are sensibly impaired in colour; from this one would deduct that the sucker or base of *Hydra* either derives nourishment, or its inherent poisonous nature kills the chlorophyll. The *Hydra* become, too, so like the bloodless leaves that they are most difficult to find. I also notice that when the water-spider tumbles round, the *Hydra* lay themselves against the leaves till they look part of them. Is this to avoid notice? That they are marvellously protected by their resemblance to the duckweed-roots and faded *Anacharis* stems is evident to any daily observer.

On February 24th the cold became great here; ice formed in the bottles. To evade this all were covered with net; but on 26th the cold was so intense I brought the *Hydra* bottle indoors, and had to set it near the fire to unthaw, and afterwards in the window. All the other aquaria were covered with glass, rugs, etc., and despite of the cold and ice at the top and at sides of glass no inmates died. The *Hydra* looked very poor and weak after the unfreezing process. They were restored to outdoor life on the 29th, but some seem to have died. Out of seven I had, I only perceived three. They may have been eaten. I also brought in an *omnium gatherum* jam-jar into the drawing-room, recently obtained for amusement. In looking by candle-light at it on the 26th, out of a mass of *Spirogyra*, etc., I perceived six pink mites the size and colour of a pale pink coral-stone in a gipsy ring. Whether they were prejudiciously influenced by the first frost, subsequent heat, or by inmates of bottle, in two days all were gone except two, whose exquisite colour had departed, they being a dusky white; these too succumbed. In the same bottle, mingled with the *Spirogyra*, was an exquisite little plant of a dark blue-green, looking like beads strung together. I placed this apart in a small glass globe. On placing a portion under a microscope the fronds represented the appearance of a lovely miniature hornwort (pondweed), with dark spots or cells. I have never seen anything like it before, but from my books I conclude it is *Bactrachospemum monoliforme*. I have it now living in a jar with a little duckweed.

In the aquaria (of which I have thirty-four of various sizes full just now) in a jam-bottle, a creature nearly three inches long, like a rounded piece of barley-sugar, with white segments or rings is to be seen. The basal disc has fourteen white legs, the hood-like head appears to have two white eyes or suckers. It is generally attached to the side of the glass or a weed by suckers, waving about apparently seeking prey. Sometimes it holds by head and sucker to weed, like a root suspended in the air. When it walks it loops like the looper caterpillars, almost pressing its head down by its basal sucker. In another bottle I have a sort of similar three-inch blackish animal, striped like a tabby cat, the structure of which resembles the barley-sugar animal, but with this important difference, that it assumes the elongated ovate form of a leech at periods, and adheres tightly to the glass. On moving it, it progresses like the former animal, but elongates itself into a bar for repose at the bottom of the jar.

The last two days countless small tealeaf-looking cadises, as mentioned before, are hurrying round like a steamer in motion. As they get older they become perfectly quiescent, and are evidently a lot of cadis, but of what I have not yet found out, though I am watching further development.

A squirrel, who pays daily visits to the garden, was exceedingly troublesome lately in climbing the big lime-tree opposite my writing table, nibbling off and stripping branches innumerable, but the last week or so has ceased, perhaps finding other occupation.

*Shiplake Vicarage, Oxon;*
*March 22nd*, 1896.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*A Dictionary of the Names of Minerals, including their History and Etymology.* By ALBERT HUNTINGTON CHESTER, E.M., Ph.D., Sc.D. xxxviii and 320 pp. 8vo. (New York: John Wiley and Sons. London: Chapman and Hall, 1896.) Price 15s. net.

It is always a satisfaction to meet with such a book as this. Dictionaries with the derivations of the names of species in any branch of natural science are scarce enough. Students, as a rule, neglect the value attaching to names of animals, fossils or minerals; so that when their turn comes to bestow names on newly-discovered species, it too frequently happens that want of suitability and general fitness lamentably shows itself in the name given. Not in any division of nature does this display itself more than in uninomal system adopted by mineralogists. Many of these names are, to say the least, fantastic, and furnish a sad want of uniformity in their termination. The opportunity for some specific terminal for mineral names was indicated twenty years since by Professor C. U. Shepard, of Amherst College. Massachusetts, who suggested that the commonly-used terminal "ite" should be applied to all recognised mineral species, and the termination "ine" should apply to all variety names. To use an expression not uncommon in the State, which is claimed to contain the "hub of the world," his proposal did not "catch on." So long as a hundred and fifty years ago Sir John Hill, in his "History of the Fossils," divided minerals into named genera and species, with classes and orders in which to arrange them. Not only did the system never come into use, but its inventor abandoned it some twenty years later. Since then, other attempts have been made in the same direction, but chemical analysis and the foundation of the science of crystallography led to the adoption of the present arrangement. Of fantastic names, some amusing instances may be found. A green fibrous arsenite of copper, was called "erinite" by Mr. W. Haidinger, because it was *supposed* to come from Ireland. The same name has been applied to a reddish clay-like mineral, allied to montmorillonite, from Giant's Causeway. Printer's errors are responsible for not a few long-accepted names, such as "glorikite," which is a mistake for glinkite, named in honour of General Glinka, who was Governor of the Ural Mines. This dictionary contains no less than 4,627 names of minerals, though many of them are either popular names, obsolete, or synomyms. A useful addendum is a dictionary of authors of mineral names with their species. The list of titles of works cited in the dictionary is in itself a bibliography of mineralogy, for it occupies eighteen pages of small type. Dr. Chester's work is one which should be in every scientific library and in the hands of every mineralogist. We think that its issue cannot fail to give an impetus to the study of minerals.

*A Hand-book to the Order Lepidoptera.* By W. F. KIRBY, F.L.S., F.Ent.S. Part 1. Butterflies—vol. ii. 348 pp. 8vo. 36 coloured plates, and numerous figures in the letterpress. (London: Allen and Co., Limited, 1896. Allen's Naturalist's Library.) Price 6s.

In our notice of the first volume of this work (S.G., N.S., vol. i, page 256), we pointed out that Mr. Kirby had struck out a new design in treating the well-worn subject of butterflies and moths; this he maintains in the second volume with much success. In it he nearly completes his observations on the butterflies, and will in the next volume commence his survey of the moths, after dealing with the Hesperiidæ. We note with some dismay that Dr. Bowdler Sharpe in his editorial note to this volume of "The Naturalist's Library," says, "Mr. Kirby is especially well-known as an authority on entomological bibliography, and it is not surprising to find that his recent researches into nomenclature of butterflies have led him to arrive at conclusions concerning the proper names of our British species somewhat different from those adopted from most modern works." *Colias edusa* is to go at last, and in its place *Eurymus hyale*; whilst we also lose *Colias hyale* to find *Eurymus kirbyi*. We look in vain in the systematic index for our familiar *Lycæna ægon*, but have the good luck to find the silver-studded blue, bearing doubtless the correct scientific name of *Plebius argus*, so called by Linnæus, as it appeared in "Systema Naturæ," in 1758. Mr. Kirby's survey of the different families of butterflies occurring in Britain, and comparison with other members of the same families in other regions, is most instructive and well done. It constitutes the leading feature of the book, and is the more satisfactory because we can fully depend on whatever Mr. Kirby writes for us. The coloured plates are generally much better than those in many other works far more expensive. This volume confirms our opinion that Allen's Naturalist's Library is a liberal education in itself.

*Biological Experimentation: Its Functions and Limits.* By SIR BENJAMIN WARD RICHARDSON, M.D., F.R.S., 170 pp. 8vo. (London: George Bell and Sons, 1896.) Price 2s. 6d. net.

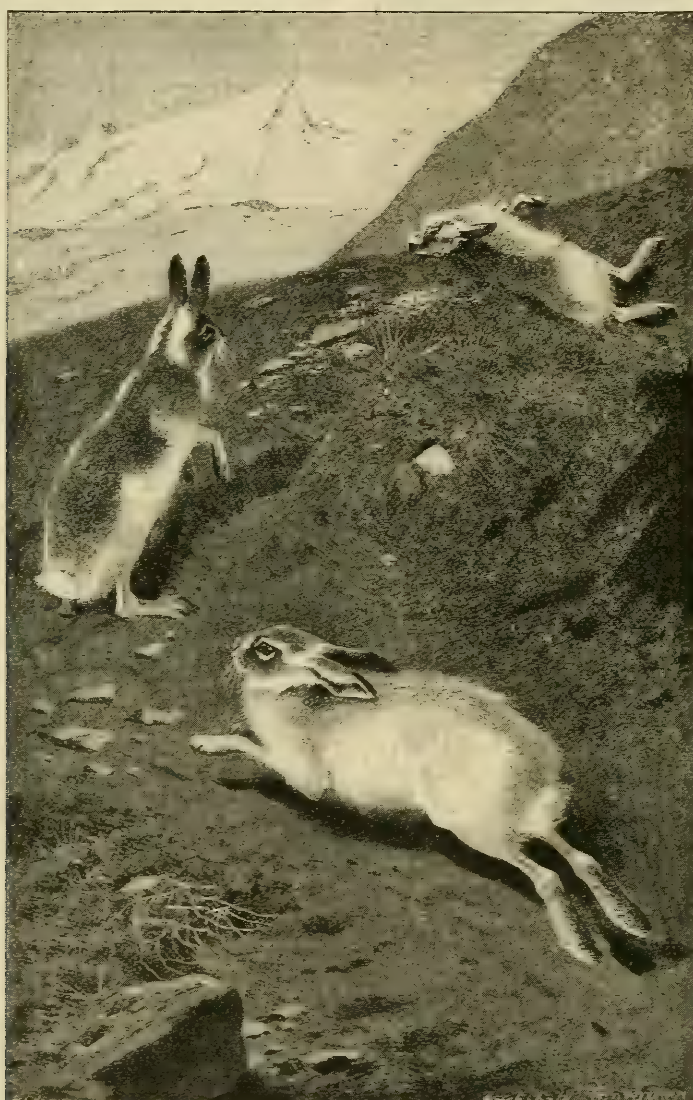
Whenever we take up a book by Sir Benjamin Ward Richardson, we settle comfortably in our chair with the feeling that we are going to enjoy pages clearly setting forth well-arranged facts in plain language. This book is no exception, for although by no means an entrancing subject, it is a pleasure to read on page after page. The origin of the book was founded upon an invitation by the Council of the Leigh-Browne Trust to Dr. Richardson, to give replies to nine questions bearing more or less on the question of the necessity of vivisection. His answer as given on page 161 is good and unmistakable. One admirable chapter is a history of the "Discovery of Anæsthesia," and it is well worth while getting the book for the chapter alone.

*One Thousand Difficult Words from Examination Papers.* Part 2, for Seniors. Selected by A Practical Teacher. (London: Relfe Bros.) Price 3d.

These thousand words are evidently selected, as stated in the title, and are by no means "catchy," or the trick words often heard at spelling bees. The only disadvantage seems to be in their arrangement, which would have been better if alphabetical.

*The Hare.* 263 pp. 8vo, with 9 illustrations by G. D. GILES, A. THORBURN and C. WHIMPER. (London, New York and Bombay: Longmans, Green and Co., 1896.) Price 5s.

This is the latest of Messrs. Longmans' "Fur and Feather Series," edited by Mr. Alfred E. T. Watson. "The Natural History of the Hare" is little book is to deal with the first section, in which Mr. Macpherson chattily compresses into about sixty pages a vast amount of carefully selected lore appertaining to the history of hares. This he groups in chapters headed: "Studies in Hare Life," "Pages of Hare Lore," "The Hare and the Lawyers," and "The Hare and her Trod."



"A HARE DRIVE."
From "*The Hare*" (Longmans' "Fur and Feather Series.")

written by the Rev. H. A. Macpherson; its "Shooting" by the Hon. Gerald Lascelles; "Coursing" by Charles Richardson; "Hunting" by J. S. Gibbons and G. H. Longman; and, finally, its "Cookery" is explained artistically by Colonel Kenney Herbert. Consequent on all this eminent attention, the hare doubtless feels either important or "mad." Our business in noticing this beautifully produced Among the more important and little-understood features connected with hares are their diseases. Referring to them, the author remarks with great truth: "We know very little about the diseases from which wild animals suffer. In confinement their maladies are connected more or less with improper feeding and want of adequate exercise and fresh air; and these disorders can be

overcome by patience and trouble. But I never yet met anyone who had devoted special attention to the investigation of the diseases which affect our smaller wild animals." Further he says: "The topic seems to suggest fresh fields for skilled research," and again, "Men neglect to study the habits of the birds or beasts which live around them, simply because, they say, 'they are common.' Almost every bird or beast is common somewhere; but its abundance or scarcity is of minor importance to the true naturalist." The common brown hare of England and the Lowlands of Scotland is a creature of temperate climates. Mr. Macpherson, quoting Mr. Oldfield Thomas, of the British Museum, says there are three distinct varieties in Europe. One with fur of thick texture, and showing a tendency to become white in winter, inhabits North-east Europe; the central variety of Europe, which includes our English hare, is characterised by having fur of moderate texture; whilst the third form inhabits Southern Europe, and exhibits a remarkable thinness of its fur, when compared with the other two varieties. We give, by the courtesy of Messrs. Longmans, two of the illustrations from this work: one showing the "red" hare, in the picture entitled "Making for the Hedgerow," and the other of "blue" hares, or "mountain hares," an entirely different race from the red, in that labelled "A Hare Drive." Red hares in Britain vary considerably in weight,

"Making for the Hedgerow."
From "*The Hare*" (Longmans' "Fur and Feather Series.")

"plenty weigh nine and ten pounds, but it is a very big hare, indeed, that reaches eleven pounds; though enormous individual hares have undoubtedly scaled between thirteen and fourteen pounds." The South European hare averages only five or six pounds weight. The temptation to quote liberally from Mr. Macpherson's hare lore is great, for he is in his best anecdotal style, which is, indeed, passing pleasant to read—but we must forbear. This is in all, a most charming book for both country and town house. In the former we may watch from the windows the antics of the mad hares "in the season of the year," as the old poacher's song has it; while in the town house we may pour over the pages by Colonel Kenney Herbert, until our appetite is whetted by anticipation and the delicate aroma of the gentle hare—when "jugged."

*Earth-Knowledge: A Text-book of Physiography.* By W. Jerome Harrison, F.G.S., and H. Rowland Wakefield. Part ii., sixth edition. 246 pp. small 8vo, illustrated by 103 figures. (London: Blackie and Co., Ltd., 1896.) Price 2s. 6d.

This edition of Part ii. of "Earth-Knowledge," which is devoted to advanced physiography, has been revised throughout and much extended to meet the requirements of the syllabus for physiography issued by the Science and Art Department in 1895. The bulk of the book has been increased by half, and the figures doubled in number. As a teachers' aid, this and Part i., which we noticed in November last, are excellent, on account of their conciseness and the ease with which any subject may be found and explained. To the student who is coaching for the South Kensington Examination they are a necessity, and every reader is sure to learn something new from them.

*The Honey Bee: A Manual of Instruction in Apiculture.* By Frank Benton, M.S., 118 pp. crown 8vo, illustrated by 10 plates and 76 figures. (Washington: Government Printing Office, 1895.)

This admirable manual for the apiculturist is based upon scientific knowledge as well as mature practice. It opens with a biological account of bees, commencing with the various species of honey bees of the North American continent, and the introduced kinds. This is followed by some account of their anatomy. The rest of the work is devoted to the economic aspect of honey production, and the most modern modes of management. The importance of the industry in the States may be gathered from the Government estimate that the annual value of honey is upwards of £4,000,000. The illustrations are admirable, treating of apparatus in bee-culture, food plants, anatomy, and diseases. The work is issued by the U.S. Department of Agriculture, Division of Entomology, and is, we believe, given free to suitable societies and individuals.

*Transactions of the English Arboricultural Society.* Vol. iii., part 1. 145 pp. medium 8vo. (Carlisle: G. and T. Coward. London: Simpkin, Marshall, 1895-96.) Price 1s. 6d.

This part contains seven articles, by various writers, upon forestry in some form. Several of the communications are of importance. There are also minutes of meetings and excursions, with lists of members of the society and books in its library.

## MICROSCOPY

Aquatic Hymenoptera.—We wish to call attention to, and ask the assistance of, microscopists in the excellent work by Mr. F. Enock in elucidating the life-histories of these insects.

Parasitic Copepoda.—The Journal of the Marine Biological Association, vol. iv., No. 2, contains a list of the Parasitic Copepoda of fish obtained at Plymouth, by Mr. P. W. Bassett-Smith, F.R.M.S., on the classification of Gerslæcker, which is founded largely upon the minute anatomy of the animals. This paper will be useful to microscopists studying the Copepoda.

Quekett Microscopical Club.—Mr. Edward Milles Nelson, F.R.M.S., in his presidential address, delivered February 21st, reviewed the work for the past year, more especially with regard to improvements in instruments and auxiliary apparatus of the previous year. His remarks are printed in the journal of the Club for April. The report of the committee appears in the same part; from it we find that the attendance on meeting nights averaged fifty-two members and friends. The cabinet was enriched by seventy-nine slides, of which no less than sixty-six were from Mr. Rousselet, chiefly delicately mounted rotifers. An important gift was by the Misses Harman, of a a cabinet containing one thousand specimens prepared by their uncle, the late J. G. Tatem, of Reading, a member of the club for twenty years.

Mounting Mediums.—The preservation of microscopic objects is a subject which cannot fail to be interesting to many of the readers of Science-Gossip, and as there appears to be some little difference of opinion amongst microscopists as to which medium is the most durable, a little friendly discussion in these columns might prove beneficial in arriving at a decision. So far as my own experience goes, I have come to the conclusion —after many trials—that there is no mounting medium equal to Canada-balsam, glycerine or glycerine-jelly. Objects preserved in these seem to improve with age, especially in the case of Canada-balsam; whilst those mounted in other media deteriorate, as I proved to my cost only a few weeks back, when I had the disappointment to find a valuable slide, prepared by an eminent mounter, absolutely worthless, owing to the preserving substance having perished. As some proof of the trustworthiness of Canada-balsam, I may mention that I have some slides in my collection prepared by the elder Topping quite forty years ago, which are as good now as the day they were purchased; and the accompanying photograph of the ovipositor of the green saw-fly, which was taken from a slide (likewise mounted in balsam) prepared upwards of 15 years, will also furnish ocular demonstration as to its value as a preservative. Perhaps some of my brother microscopists will give us the benefit of their experience. —*J. C. Webb, F.E.S., 32, Henslowe Road, Dulwich.*

[The photograph shows the object to be in perfect condition. Ed. S.-G.]


CONDUCTED BY FRANK C. DENNETT.

| | 1896. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| | | A.M. | P.M. | | |
| Sun ... | July 1 ... | 3.49 ... | 8.18 ... | 6.44 ... | 23° 4′ N. |
| | " 11 ... | 3.58 ... | 8.12 ... | 7.25 ... | 22° 1′ |
| | " 21 ... | 4.10 ... | 8.2 ... | 8.5 ... | 20° 20′ |
| | " 31 ... | 4.25 ... | 7.48 ... | 8.45 ... | 18° 6′ |
| | | Rises. | Souths. | Sets. | |
| | | P.M. | A.M. | A.M. | |
| Moon ... | " 1 ... | 10.59 ... | 4.39 ... | 10.41 | |
| | | A.M. | | P.M. | |
| | " 11 ... | 4.12 ... | — ... | 9 0 | |
| | | P.M. | P.M. | | |
| | " 21 ... | 6.17 ... | 9.35 ... | — | |
| | | P.M. | A.M. | A.M. | |
| | " 31 ... | 9.43 ... | 4.34 ... | 11.56 | |
| | | Souths. | Semi Diameter. | R.A. | Dec. |
| | | A.M. | | | |
| *Mercury*... | " 1 ... | 10.33 ... | 4″ 2 ... | 5.14 ... | 19° 31′ N. |
| | " 11 ... | 10.43 ... | 3″ 3 ... | 6.1 ... | 21° 59′ |
| | " 21 ... | 11.22 ... | 2″ 7 ... | 7.17 ... | 22° 52′ |
| | | P.M. | | | |
| | " 31 ... | 0.7 ... | 2″ 5 ... | 8.45 ... | 19° 48′ |
| | | A.M. | | | |
| *Venus* | " 1 ... | 11.55 ... | 4″ 8 ... | 6 34 ... | 23° 41′ N. |
| | | P.M. | | | |
| | " 11 ... | 0.8 ... | 4″ 8 ... | 7.28 ... | 22° 45′ |
| | " 21 ... | 0.21 ... | 4″ 9 ... | 8.20 ... | 20° 42′ |
| | " 31 ... | 0.32 ... | 4″ 9 ... | 9.11 ... | 17° 40′ |
| | | A.M. | | | |
| *Mars* ... | " 1 ... | 7.12 ... | 3″ 5 ... | 1.53 ... | 9° 50′ N. |
| | " 11 ... | 6.59 ... | 3″ 6 ... | 2.20 ... | 12° 14′ |
| | " 21 ... | 6.47 ... | 3″ 8 ... | 2.47 ... | 14° 25′ |
| | " 31 ... | 6.33 ... | 4″ 0 ... | 3.13 ... | 16° 21′ |
| | | P.M. | | | |
| *Jupiter* ... | " 21 ... | 1.13 ... | 14″ 4 ... | 9.12 ... | 16° 55′ N. |
| *Saturn* ... | " 21 ... | 6.43 ... | 8″ 0 ... | 14.43 ... | 13° 23′ S. |
| *Uranus* ... | " 11 ... | 7.52 ... | 1″ 9 ... | 15.13 ... | 17° 38′ S. |
| | | A.M. | | | |
| *Neptune*... | " 11 ... | 9.49 ... | 1″ 9 ... | 5.12 ... | 21° 38′ N. |

MOON'S PHASES.

| | | | | | |
|---|---|---|---|---|---|
| *3rd Qr.* ... | July 3 ... | 1.23 a.m. | *New* ... | July 10 ... | 7.35 p.m. |
| *1st Qr.* ... | " 17 ... | 4.4 p.m. | *Full* ... | " 24 ... | 5.45 p.m. |

SUN.—The spots are now usually small, both in number and size, although there was a slight increase in activity about the first days of June. On three consecutive days in April, and again on three days in May, the Greenwich photographs show no spots on the disc.

MERCURY is at its greatest elongation W. (21° 13′) on July 4, and may be looked for as a morning star, rising more than an hour before the Sun.

VENUS, being close to the Sun, is badly placed. The same must be said for Jupiter and Neptune.

SATURN sets about midnight in the middle of the month. The ring is a magnificent object; on July 29th the greater axis of the outer ring is 39·55″, and the minor axis 13·79″.

AURORAL displays of considerable brilliancy were seen on May 3rd, lasting three hours, and May 17th, lasting two hours. Mr. C. Roberts, of Aberdeen, sends detailed descriptions to our contemporary, "The English Mechanic."

METEORS.—Large meteors should be looked for on July 11, 20-21, 25-30.

VARIABLE stars need persistent and careful watching. During July the following stars of this class are well placed for observation :—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| η Aquilæ ... | 19.45 ... | 0° 40′ N. ... | 3·5... | 4·7... | 7d. 4h. 14m. 48. |
| 12 " * ... | 18.55 ... | 5° 54′ S. ... | 5 ... | 6 | |
| μ Cephei ... | 21.40 ... | 58° 11′ N. ... | 4 ... | 6 ... | 5 or 6 years. |
| $\chi^2$ Cygni† ... | 19.45 ... | 32° 35′ N. ... | 4 ... | 13 ... | 406·42 days. |
| 34 P " ... | 20.13 ... | 37° 37′ N. ... | 3 ... | 6 | |
| T " ... | 20.41 ... | 33° 51′ N. ... | 5 ... | 6 | |
| β Lyræ ... | 18.45 ... | 33° 12′ N. ... | 3·5... | 4·5... | 12d. 21h. 51m.‡ |
| 13 R " ... | 18.51 ... | 43° 46′ N. ... | 4·3... | 4·6 | |
| R Scuti ... | 18 40 ... | 5° 50′ S. ... | 4·7... | 9 ... | 71·7 days. |

* Variable in colour, yellowish-white to red.

† s.f. The double star χ on the maps. Discovered by Kirch, in 1686, to be variable. It is splendidly red, but seems to lose colour as it gains light.

‡ Within this period there occur two maxima and two unequal minima.

SATURN'S RINGS.—At the April and May meetings of the British Astronomical Association, there were most interesting discussions upon the rings of Saturn. M. Antoniadi, under very fine definition, at Juvisy, found the division of the outer ring, known as Encke's, absent, whilst the ring itself seemed broken, as it were, into patches or fragments. A few days after, Mr. C. Roberts found the Encke division in its normal state. Abundant evidence is being gathered that the ring is not constant in appearance; but this subject is so wide that we must shortly deal with it in another column.

SWIFT'S COMET.—There appears to be some doubt as to whether the comet generally observed was really that discovered by Swift. The comet was travelling almost directly north, just bearing slightly to the east, and should have been, according to calculation, some five degrees further south, on April 13th, than the place announced by Swift. Moreover, Professor Lewis Swift described the one he saw as travelling slowly to the west. Was the announcement right, after all, that the Lick observers saw Swift's own comet on April 16th, to the south-west of its place of discovery? The writer saw the comet travelling through Cassiopea on May 9th, 10th, 11th, and on the last occasion was struck with its increased faintness. Mr. S. H. R. Salmon, on May 27th, told the British Astronomical Association how, on May 4th, he had noticed a star of about ninth magnitude, when observed through the comet, dimmed to the extent of at least one magnitude. This observation is almost, if not quite, the first record where a star has thus seemed to lose its lustre whilst covered by a comet. Moreover, some other stars were not appreciably fainter when covered by this same comet. Was it owing to any peculiarity of colour in the light of the star?

METEOR OF APRIL 12TH.—I was interested to read the notice in SCIENCE-GOSSIP of the meteor of April 12th. It was by far the most brilliant I have ever seen. I was crossing a field about three miles from Leicester, and could with difficulty trace the path in the dusk of the evening, when suddenly the scene was lit up by a flood of light as of moonlight, and glancing upwards I saw a large meteor slowly sailing across the heavens, leaving a rocket-like trail of sparks behind it. It was moving in a south-westerly direction, and when I first saw it it was about forty-five degrees above the horizon, and disappeared about thirty degrees above the horizon.—*Geo. C. Turner, Parkhurst, Upper New Walk, Leicester; June 11th.*

# SCIENCE GOSSIP

SIR JOSEPH PRESTWICH, the eminent professor of geology, died from a heart affection at Shoreham, Kent, on Tuesday, June 23rd.

THE fern-exterminator is active in Devonshire. Periodically there appears an advertisement in certain London halfpenny papers, where "a lady" offers forty roots of "fine and rare" ferns for the modest sum of one shilling and fourpence.

THE Twenty-sixth Annual Report of the Wellington College Natural Science Society, embracing work done in 1895, is to hand. The Saturday meetings and lectures appear to have been successful. Observations of a phenological and meteorological character have been made, and reports appear on other sections.

A FIVE-POUND meteorite, which fell last April in an orchard near Namur, in Belgium, nearly killing a young man who was digging there, has been examined at the University laboratory at Ghent. It consists of a crystalline substance, containing iron, trolleite, olivine, bronzite, and chondrodite.

ON June 11th, the Falls of Foyers, in Scotland, were diverted to the manufacture of aluminium, which is obtained from the mineral bauxite, found in quantity in co. Antrim, in Ireland. There it is converted into aluminia, and shipped in the form of white powder to Foyers, to be further treated and turned into its metalic form, now becoming generally used for many purposes.

THE GEOLOGISTS' ASSOCIATION OF LONDON held a series of interesting excursions at Whitsuntide. They included the districts surrounding Chippenham, the headquarters being at the Angel Hotel in that town. Calne was also explored, and the underground quarries at Box of the Bath Stone Firms were taken on the way back to London, on the Tuesday.

THE July excursions of the London Geologists' Association include one on the 4th to Potter's Bar and Hatfield, conducted by Mr. A. E. Slater, B.Sc.; July 11th, whole day to view the new railway cuttings at Catesby, Northamptonshire, led by Mr. Beeby Thompson, F.G.S.; and from July 27th to August 1st to West Somerset and North Devon. Particulars may be obtained from Mr. Horace W. Monckton, secretary of excursions, 10, King's Bench Walk, Temple, E.C.

AMERICAN UNIVERSITIES seem to be doing all in their power to push forward the work of Astronomy. Within the past twelve months four of them have established or decided upon establishing observatories. At Champaign, the University of Illinois is going to set up a twelve-inch achromatic equatorial. At Philadelphia, the University of Pennsylvania has an eighteen-inch. In connection with the coming opposition of the planet Mars, the Chicago University has arranged to set up a moveable observatory in Mexico, where it is to be hoped good work may be done.

THE opening of the Botanic Society's Gardens, Regent's Park, on certain days in the week during summer, to the general public, by payment, has proved a great success. These are to be supplemented by six musical promenades on consecutive Saturday afternoons, from June 20th, the admission being one shilling.

THE cases of rabies among dogs in the Metropolitan district of London are reported as 25 in January, 25 in February, 22 in March, 11 in April, and 10 from 1st to 21st of May. During that period, upwards of 20,000 dogs were "arrested" by the police, most of which were destroyed.

PROFESSOR DR ADALBERT KRÜGER.—A few weeks since, this well-known Continental worker passed away. He was born at Marienburg in 1832, and in 1853 obtained an appointment in the Berlin Observatory. He later assisted Argelander at Bonn. In 1862, he became Director of the Observatory at Helsingfors for a period of fourteen years. Thence he took charge of the Gotha Observatory until 1880, when he removed to Kiel, where his work has been continued until his death, in his sixty-fourth year. Dr. Krüger was Director of the Bureau Central des Telegrammes Astronomiques, and of the important *Astronomische Nachrichten*.

LORD KELVIN'S jubilee celebrations have been conducted at Glasgow with the great success they deserved. The number of persons of consequence in the scientific world who assisted is remarkable. The ocean telegraph companies vied with each other in showing their gratitude; for without his invention of the mirror galvinometer, their existence could not be commercially successful. It was this invention which won for Mr. Thompson his knighthood in 1866, and led on to his peerage in 1892. It has fallen to the lot of Lord Kelvin to occupy for half a century the same professorial chair at Glasgow University. During that period, he has seen the study of Science changed in public opinion from a subject either little thought about or actually scoffed at to the present respect in which it is held. This has been largely brought about by such men as Lord Kelvin, who have so admirably adapted the discoveries of science to the advantages of commerce. With the mass of people in the days when Thompson took the chair at Glasgow, science was rarely considered; but when one invention after another emanated from the result of scientific investigation, each ministering in some way to their personal comfort, people began to believe in science and cease to rail at its votaries.

THE extent of Lord Kelvin's scientific enquiry is perfectly unrivalled. It is not too much to say that his researches include the whole range of physics, varied by mechanical and natural sciences. The great charm of this learned ornament of human civilization is the lucidity with which his explanations, whether spoken or written, are placed before his audience. This is largely attained by an absence of encumbrance of details, and whatever may be the temptation for self-advertisement it is rigidly subordinated to the simple explanation of whatever great principle he may be for the moment expounding. Perhaps this is the secret of his great success as a lecturer, for no matter how involved or abstruse his subject he always commands attention. We trust Lord Kelvin may for many years to come be spared to continue the noble life of invention and discovery which will pass his name with honour into far posterity.

# SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

Bulletin de la Société Zoologique de France (Paris, February, 1896). M. Edouard Chevreux discusses and figures *Gammarus berilloni*, a crustacean species, while M. A. Dollfus contributes an article on the "Terrestrial Isopod Crustacea of Mexico," in which he describes and figures the following new species: *Armadillo dugesi*, and *Metoponorthus saussurei*. M. Jules de Guerne and M. Jules Richard describe a new copepod crustacean from Boghara, Turkistan, *Diaptomus blanci*, with figures in the text. This part also contains the Presidential Address by M. E. L. Bouvier.

Annaes de Sciencias naturaes. (Oporto, 1896.) Dr. Paulino de Oliveira continues his "Catalogue of the Hemiptera of Portugal," while the same author in conjunction with Dr. Lopes Vieira continue their "Catalogue of Mammalia of Portugal." A further contribution on "The Fishes of the Cape Verde Islands," by Don Joao Cardoso, jun., will be welcomed by ichthyologists. The Editor, Dr. Augusto Nobre, continues his "Mollusca and Brachiopoda of Portugal," while continuations of "The Coleoptera of Sabrosa," by Don Correa de Barros, and "Birds of Portugal," by Mr. W. C. Tait, complete this part.

La Feuille des Jeunes Naturalistes (Paris, May, 1896). M. E. L. Bouvier contributes the first instalment of a paper on a family of Crustacea, *i.e.* the Paguridæ (hermit crabs) of the European Seas. A woodcut of *Eupagurus Bernhardus* and some minor details of other species accompany the text. M. Schlumberger gives a *resumé* of a contribution by M. Schaudinn in "Sitzungs Bericht der Gesellschaft von Naturforschende Freunde," on Plastogamy and Karyogamy of Foraminifera. In a continuation of his paper on "Myriapod Fauna of France," M. H. Broelemann describes a new species, *Julus odieri*, in which he figures the pair of copulatory legs. M. M. Cossmann conintues his review of Palæoconchology, in which he deals with the fauna of the "Muschelkalk of Lombardia," by Dr. Annibal Tommasi; "Versteinerungen des Lias und Unteroolith von Chile," by W. Moericke; "Beitrage zur Kenntniss der Kreide in den Südalpen," by Georg Boehm; "Ueber einige Kreide versteinerungen vom Gabun," by F. Kossmat; "Synopsis dei molluschi terziari delle alpi Venete," by M. Vinassa de Regny; "Die Pontische Fauna von Kurd im Comitate Tolna," by Dr. Emerich Lörenthey; and "Beiträge zur Kenntniss der unter pontinischen Bildung des Szilagyer Comitates und Siebenburgens," by Dr. Emerich Lörenthey.

Annalen des K. K. Naturhistorischen Hofmuseums (Vienna, 1895; vol. x., parts 1 and 2).—Professor Dr. R. Hoernes contributes an important article on a rare fossil shell, *Pereiraia gervaisii*, originally assigned to *Pleurotoma*, but made the type of a new genus by Crosse. Its occurrence in Austria was first made known by Schlönbach, and subsequently specimens were found in Miocene formations of lower Carniolia and Hungary; two lithographed plates and two figures in the text give a good idea of this handsome shell. Herr Friedrich Siebenrock treats of the skeletons of Scincoideæ (sand-lizards) and Anguideæ (blind-worms), with one plate and four figures in the text. A monograph of the genus *Sphex* (digging-wasps), by Herr Kohl, illustrated by two lithographed plates of anatomical details of a large number of species, will be found very useful by hymenopterists. A voluminous report, for 1894, on the different departments of the Museum, by the Director, concludes Part 1. Ethnologists and Anthropologists will find in Part 2 a very interesting and instructive article by Dr. Wilhelm Hein, on the evolution (Entwickelungsgeschichte) of ornaments of the Dyaks, illustrated by twenty-nine figures in the text, showing many complicated patterns of various objects in the museums of Vienna, Hamburg, Amsterdam and Leiden. Dr. Gustav Mayr, in a paper on African Formicideæ, describes several new species of ants. The Curator and Director of the botanical department of the Museum, Dr. Günther Ritter Beck von Mannagetta, communicates the seventh part of his "Flora of South Bosnia and the neighbouring part of the Hergegovina," dealing with Papaveraceæ—Umbelliferæ. Students of Foraminifera will be pleased with the paper by Professor A. Rzehak on "Some remarkable forms from the Austrian Tertiary," with two plates illustrating many new and beautiful species.

La Feuille des Jeunes Naturalistes. (Paris, June and July, 1896.) Students of Crustacea will find the conclusion of M. Bouvier's synoptical tables on "The Pagurineæ of the European Seas," with many figures in the text, very useful. M. Oberthür, in his continuation of "Mimicry in Insects," deals with Papilio, in which many instances of this curious and interesting phenomenon occur. M. Xavier Raspail writes on the Marsh Otter (*Mustela lutreola*), also known as the European mink, the existence of which, in France, seems to have been doubted, having been frequently confounded with the polecat. Numerous captures in various parts of twelve Departments prove its existence in that country beyond doubt. The conclusion of the series of articles by M. Broelemann on "The Myriapodous Fauna of France," with figures in the text, will be welcomed by students of this class of Arhropoda. M. E. de Laroy writes on the breeds of horses in Holland; according to that author these horses have retained more of the primitive type than in any other country. The three principal breeds are those of Friesland, Guelderland and Utrecht. The first contains a remnant of the Andalusian type, which is attributed to importations made during the occupation of Holland by the Spaniards in the sixteenth century; black appears to be the predominant colour in this breed. The Gueldre horse is larger than the former, very strong and gentle, and possesses particular qualification for use as a coach-horse; it is stated to be a cross-breed between the indigenous horse and that of Oldenburg, and resembles the Normandy horse to such a degree as even to deceive connoisseurs; in colour it is usually a bay. The Utrecht horse is intermediate between the two other breeds, resembling both in many respects; it is considered a handsome and good carriage horse, being very energetic and sagacious; like the latter it is usually of a bay colour, but darker. Three photogravures accompany this interesting article, representing each breed.

## Botany

Abnormal Primrose.—I send you some specimens of flowers of *Primula vulgaris* with much elongated tube to the calyx. Every bloom on this plant is abnormal; it is growing in the garden.—*Francis Buckell, Park House, Romsey.*

Abnormal Lilac.—I send you a curiously abnormal specimen of white lilac from my garden, you will observe that several of the flowers show deviation from the type. In one of them I make out five corollas and ten stamens.—*Martin J. Teesdale, St. Margaret's, Thurlow Park Road, Dulwich; May 6th,* 1896.

Early Primroses in Aberdeenshire.—One result of the mild season during the early part of this year was that I gathered primroses in flower here on February 7th. The flowers were both well-formed and well-coloured, but rather below average size. They have flowered on since that date and have been showing superior flowers.—*W. Wilson, Alford, Aberdeenshire.*

Cyathus vernicosus in Ireland.—Mr. R. Lloyd Praeger records the occurrence in a cold greenhouse at Macedon, Belfast, of this small birds'-nest fungus. It has been found, year by year, for more than twenty years in flowerpots containing various plants.

Abnormal Cotyledon umbilicus.—We have received a remarkable spray of *Cotyledon umbilicus* in which the stem is fasciated and about double its ordinary thickness. The flowers are not directly attached in the ordinary manner, but arranged upon sixteen branches, some of them being nearly as long as the chief stem. The termination of the stem is blunt, with five of the shorter branches arranged in loose rosette. The specimen was found near Lynmouth, North Devon, by Mr. C. A. Briggs.

Abnormal Feverfew.—I send you some shoots of the common feverfew, which I think may interest you. They are evidently meant to be flowers, for you will be able to arrange them in a series from an almost ordinary shoot to an imperfect flower surrounded with leaves in the place of bracts. They were picked off two plants which have been moved twice (I think) during the winter, which has been very mild here, no hard frost or snow. Two calceolarias have lived out-of-doors all the winter.—*Frank Sich, jun., Niton, Isle of Wight.*

Pyrus japonica Fruiting.—The *Cydonia* or *Pyrus japonica* bears fruit which ripens in the open air at one place at least in co. Armagh. I know a thatched house at Derryadd, Parish of Ardmore, on the south shore of Lough Neagh, about fifty feet above sea-level, on the front of which is an old plant of this shrub that each year is covered with bloom, and frequently brings quite a number of the fruit to maturity. I lived for many years close to this spot, and often saw and admired the ripe fruit, and they were striking and beautiful objects. I have not seen it fruit elsewhere.—*H. W. Lett, M.A., Aghaderg Glebe, Loughbrickland, co. Down.*

## Notes & Queries

Rooks Swallowing Fir-Cones.—I have often noticed rooks during a time of continued hard frost working at the cones on Scotch firs, and I have heard that on such occasions the rooks are breaking up, with their strong bills, the green cones to feed on the small seeds contained in them. To my mind appearances were against the rooks hacking the cones to pieces, for they seemed to me to keep on the trees and to pass from one branch to another when engaged in feeding on this delicacy. So I took opportunities last winter of paying close attention to them, and finding numbers busy on all the Scotch firs on my glebe, I managed to get into an out-house close under a fine large Scotch fir near my house; and from this post of observation, where I was only a few yards from the birds, I satisfied myself that the rooks did not break up the small green cones—they touched no others—but swallowed them whole. I saw them tugging at the cones, and when one was severed from a brand I distinctly observed it being swallowed, I saw the lump formed by its passing down the bird's neck just as one often sees in the case of ducks swallowing small potatoes. And I have never found any of the green cones lying about with the marks of the seeds having been removed by the rooks.—*H. W. Lett, M.A., Loughbrickland; May,* 1896.

Germination of Double Cocoanut. — The double cocoanut, though at one time very highly prized as a natural curiosity, is probably now familiar to many. From its restricted distribution —only being found indigenous in a few of the Seychelles Islands, a small group in the Indian Ocean—and the absence of inducements to its cultivation; it is scarcely likely ever to become very common. Its comparative scarcity, as well as some of the attendant circumstances, give interest to a case of the production of a fine plant from the seed in the Victoria Regia house at Kew Gardens. In June, 1892, a nut, *i.e.* the seed, was to be seen there, placed on earth in a pot, the seedling (which emerges from the depression between the two lobes forming the double nut), a fine young plant, was rooted in another pot near it, connection being maintained by the stalk attached to the modified cotyledon or haustorium within the seed, which absorbs nourishment from the endosperm and conveys it to the growing plant. At this time the plant must have been of some age, probably at least a year old, judging from its size. On a subsequent visit in September, 1894, I noticed the seedling had developed into a small palm, with several fine leaves from six to eight feet long. On a recent occasion, in June, the parent cocoanut was to be seen still connected with the palm to which it had given birth four or five years before, although no doubt all nourishment had been absorbed from it some time previously. The stalk now appears to be woody, and, with the shell of the seed, might continue to exist for several years, forming an interesting and rare natural curiosity.—*Jas. Burton, 9, Agamemnon Road, West Hampstead.*

## ZOOLOGY

Mr. Carrington's list of varieties of five-banded British land-shells is now ready. See page of Advertisements.

Nesting Site of Lark.—From time to time notices appear in nearly every newspaper of strange nesting-places, but few seem more extraordinary than a lark's nest at a railway station. On the platform of the South Canterbury Station, in a bed of pinks, on one of those carefully-kept flower-borders which always tend to make a station interesting and help to while time away when waiting for the train, a lark at the present time is busily engaged attending to the wants of a hungry brood. The nest is not well concealed, and is within a foot of the bustling steps of every passer-by. Curious as indeed the site may be, it is rendered more remarkable inasmuch as a clover-field adjoins the station on the one side, and a hay-field is close at hand on the other, either being usual places for nesting of these birds.—*H. Mead-Briggs, Canterbury*; *May* 19*th*, 1896.

Rare Fly, Hilara.—In connection with your excellent paper, Science-Gossip, I believe you undertake to identify specimens for the convenience of your readers. I have availed myself of this opportunity. The query specimen is a small fly of a brownish colour and about 1·5 mm. in length, which I found when looking for Collembola in the ordinary surface-soil of a field. At first I mistook it for a small beetle, but on capturing the specimen and placing it under a low power of the microscope, I perceived that it had six legs, and two pairs of wings. One pair resembled the "halteres" of the Diptera, the other pair were much dwarfed in size, and were totally incapable of lifting the insect into the air. They retained, however, the appearance of wings, and were not quite flat upon the abdomen of the insect. Another feature was the occurrence of two small swellings upon the first pair of legs. They were of a light colour. As I was at the time turning over the loose earth I was unable to determine whether it was running about on the surface or whether I turned it over from the soil. Soon after completing a rough sketch of the insect, I unfortunately crushed it between two slips of glass, while intending to make it into a slide, but of course was thus prevented from doing so. I send the sketch, however, which sufficiently shows the peculiar character of the wings. Could you give me any indication as to its name?—*F. E. Howkins*, 39, *Farm Road, Sparkbrook, Birmingham*; *May* 14*th*, 1896.

[The very excellent sketch sent by our correspondent indicates a Dipterous fly of the genus *Hilara*, probably the scarce *H. manicata*. There are about twenty British species in this genus, of which the swollen limb is the character. Being small in size and obscure in their habits, they are possibly considered more rare than is the case. They are carnivorous, feeding on Collembola and small insects, including individuals of their own kind. Abortive wings are common among the Diptera and Lepidoptera.—Ed. S.G.]

## IN MEMORIAM

Lord Lilford.—We have to announce with great regret that the Right Hon. Thomas Lyttleton Powys, fourth Baron Lilford, died at Lilford Hall, Oundle, on June 7th. He was one of the most accomplished ornithologists of his time, and had formed a beautifnl collection of British and foreign birds. He also possessed a considerable number of living birds and animals at Lilford Hall, which were a great source of scientific interest and pleasure to Lord Lilford, who unfortunately suffered from a physical affliction which precluded his taking very active part in either politics or county matters. He was, however, a Fellow of the Linnean and Zoological Societies and President of the British Ornithologists' Union. Lord Lilford caught a chill about a fortnight before his death, and unfortunately his delicate constitution was not able to throw it off. He was twice married, and is succeeded by his son and heir, the Hon. J. Powys. Lord Lilford had considerable literary ability, and has published several works of importance upon birds. One of his last works, indeed, the last published, was upon the birds of Northamptonshire.

Peter Inchbald.—This well-known naturalist died at Hornsea, in Yorkshire, on June 13th, at the age of eighty years. He was a F.L.S., F.Z.S. and F.E.S. Son of Dr. Inchbald, of Ardwick Hall, near Doncaster, Peter Inchbald was a well-known entomologist, his especial groups being the leaf-mining Hymenoptera and gall-gnats. He also took much interest in ornithology and was an excellent botanist, and had studied plants during many visits to Southern Europe. Mr. Inchbald was a schoolmaster and resided at Storthes Hall, Huddersfield; also at Hovingham and Harrogate. Some years ago he retired to Hornsea. His demise removes a well-known and interesting lover of Nature.

Bruce Findlay, for nearly forty years Curator of the Royal Botanical Gardens belonging to the city of Manchester, at Old Trafford, has died in his sixty-second year. Though, perhaps, more of an horticulturist than a botanist, Findlay was the means of introducing to the notice of Lancashire botanists many plants of great interest. He was born at Streatham, near London, and early got an engagement in the Thames Nurseries. He then removed to Kew Gardens. Soon afterwards he went to the North of England and held situations at Hull and Sheffield. He was, at the early age of only a little more than twenty-three years, a candidate for the appointment of Curator at the Royal Botanic Gardens at Manchester. This he secured, largely through the influence of Mr. Charles Carrington, father of the editor of this magazine, who was a member of the Committee of the Manchester Botanical Society, which then possessed the gardens. Findlay was one of the earliest to introduce public aquaria for exhibition purposes, he having erected two octagon tanks in the gardens, under the advice of the late Mr. Philip Henry Gosse.

## GEOLOGY

Geological Sections.—A student writes to ask if any of our readers, versed in practical geology, will tell him of any published work which would show a student how to construct sections from geological maps? Books tell him how to construct them from actual field work, but not from a map already completed, so as to enable him to pass the practical examination, say, of Sandhurst. Which scale of the ordnance maps is most suitable for the work, giving full information concerning elevation above the sea, dip, etc.? Also the best work on microscopical rock sections, with illustrations, and descriptions of the same? He finds this branch of the subject most bewildering to anyone taking up geology for an examination.

Thanet Sands.—In examining the Thanet Sands in the cliffs between Herne Bay and Reculver, I have been struck by what appears to be a similar structure in the sands to that in the chalk beneath, in the shape of both vertical and horizontal infiltrations of black crystalline silica, The similarity in their mode of occurrence to the flint veins of the chalk is most striking. They appear to cross one another just like the flint layers. It would be interesting to know whether they have ever been seen to run continuously from one formation to another, in sections where both formations are exposed. Where the sand had been quarried it was noticeable too that thin vertical slabs of soft sandstone projected from the loose matrix, being slightly indicated by an infiltration, only, however, slightly so, since they crumbled readily between the fingers. In the slabs the colour was the same as that of the matrix. Bishopstone Dell, a mile from Herne Bay, is apparently an old water-course. The present ditch, as it is now, about a hundred yards inland, can be but a much-dwindled descendant of the stream which at one time carved out the course and cut its way through a thickness of fifty feet of Thanet sands. And yet within a quarter of a mile, as one follows the course inland, one rises to the level of the surrounding country. Whence could arise, then, the velocity of current necessary to carve out the dell? This seems to favour the theory which I have advanced elsewhere, that there has been a local vertical movement of the land here independently of the process which resulted in the silting-up of the arm of the sea which formerly existed at Reculver. I have seen an engraving which shows half a mile of land beyond the Reculver Towers. If the land here remained quiescent, then the water-course for this distance besides must have been carved by water-power, and the stream must have been proportionately larger. Going further back to Roman times, when the town of Regulbium flourished, the land still further extended into the sea, and the water-course required still greater force for its construction. I am therefore inclined to suspect that the silting-up of the Wantsum is not only due simply to fluviatile causes, but has been assisted by an actual rise in the land.—*Edwd. A. Martin, Thornton Heath; May*, 1896.

## TRANSACTIONS

Royal Meteorological Society.—A monthly meeting of this society was held on Wednesday evening, May 20th, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. E. Mawley, F.R.H.S., President, in the chair. Mr. R. H. Curtis, F.R. Met. Soc. read a paper on the exposure of anemometers, in which he gave the results of a comparison of the records from the three anemometers at Holyhead, viz.: the Robinson, the bridled, and the pressure-tube anemometers. It was clearly shown that the force of the wind is greatly affected by surrounding objects. The author is of opinion that for anemometrical records to be reliable and of value, not only must the instrument be exposed in an open place free from local obstructions, but it is also absolutely essential that the stand which carries it shall offer practically no resistance to the wind, and that the instrument should not be placed on the roof of a house. The paper was illustrated by a number of lantern-slides. An interesting collection of photographs of clouds, sent to the society by Mr. H. C. Russell, F.R.S., of the Sydney Observatory, was also exhibited.—The last meeting of this society for the present session was held on the 17th, at the Institution, Mr. E. Mawley, F.R.H.S., President, in the chair. Mr. H. Harries read a paper on "Arctic Hail and Thunder Storms," in which he showed that the commonly-accepted opinion that hail and thunder storms are almost, if not quite, unknown in the Arctic regions is incorrect. He had examined one hundred logs of vessels which had visited the Arctic regions, and found that out of that number no fewer than seventy-three showed that hail was experienced at some time or other. Thunderstorms were not so frequent as hail, but they have been observed in seven months out of the twelve, the month of greatest frequency being August. Mr. Harries is of opinion that the breeding-place of thunderstorms in these high latitudes is in the neighbourhood of Barent's Sea. A paper by Mr. J. E. Cullum, on the "Climatology of Valentia Island," was also read. The observatory at Valencia, which is under the control of the Meteorological Office, is situated on the extreme south-west coast of Ireland, and is almost the most westerly point of Europe.

Norfolk and Norwich Naturalists' Society.—The twenty-seventh annual meeting of the Norfolk and Norwich Naturalists' Society was held in the Castle Museum on March 30th last, the President, Mr. H. D. Geldart, in the chair. Sir F. G. M. Boileau, Bart., F.R.S., F.S.A., was elected President for the coming session. The vice-presidents, treasurer, honorary secretary, auditor, and journal and excursion committees were re-elected. Messrs. G. C. Eaton, E. Corder, and H. J. Thouless were elected to serve on the committee in the place of those retiring, in accordance with Law xv. Mr. Mottram moved, on behalf of the committee, that the dates of the meetings of the society be fixed by the committee, and that Laws xxiv. and xxv. be altered accordingly. This was carried

unanimously. Mr. J. T. Hotblack read a short paper on the black rat at Yarmouth. The President (Mr. H. D. Geldart) delivered the annual address. He proceeded to make some remarks on the subject of Arctic distribution of flowering plants, especially with reference to the influence of the glacial epoch upon the flora of the British Isles. He denied the probability of the destruction of the flora during the glacial epoch, a considerable number of species showing at the present time enormous powers of endurance, and asserted the improbability of any land communication having existed between Scotland and Greenland, by means of a hypothetical bridge (marked by the existence of shoals between those countries) since the glacial epoch. A comparison was made between the existing floras of a Greenland belt, from sixty-seven degrees to seventy-one degrees N. latitude, and a district of Great Britain of an equal number of degrees, from fifty-four degrees to fifty-eight degrees N. latitude, showing that more than half of the species existing in the former are common to both, giving ground for supposing that they might have held their own in both situations during the whole of the glacial epoch.

The South London Entomological and Natural History Society.—March 26th. Mr. R. South, F.E.S., President, in the chair. Mr. F. Enoch, F.L.S., gave an admirable and instructive lecture, with lantern illustrations, on "The Life History of the Tiger Beetle, *Cicendela campestris*," being an epitome of his very numerous observations on this insect, both in nature and in confinement, during the last five years. Mr. Clark exhibited a number of photo-micrographic slides, many of which were prepared from specimens lent by members of the Society, and a fine example of the Röntgen ray photography.—April 9th. The President in the chair. Mr. R. Adkin exhibited two specimens each of *Margarodes unionalis* and *Mecyna polygonalis*, which were taken at Deal in 1877, by the late Mr. Tugwell, and contributed notes on the occurrence of these and other species of Pyralides. Mr. Barrett, on behalf of Mr. Capper, of Liverpool, some 400 drawings, coloured by hand, by Mr. Mosely of Huddersfield, of the varieties existing in Mr. Capper's collection. Mr. Tunaley, a lantern for entomological purposes, invented by himself, to obviate the inconvenience and smell of oil. It was thought that it would be, when completed, a capital success. Mr. South, a banded specimen of *Vanessa urticæ*, taken alive in his house at Tooting, on March 22nd. Mr. Williams, a living specimen of *Bombylius media*. Mr. Perks, a specimen of the Morel fungus (*Morchella esculenta*). Mr. Turner, an apparatus sent to him for exhibition, for taking moths from a lamp. It could be put on the end of a stick and worked by means of a string. Mr. McArthur, a bred series of *Hypsipetes trifasciaria*, from Hoy. They were of a rich chestnut colour, and had been reared on heath. This was considered to be a most unusual food. Mr. Edward exhibited a number of exotic Rhopalocera which were examples of mimicry. —April 23rd. Mr. T. W. Hall, Vice-President, in the chair. Mr. A. Briggs exhibited a male specimen of *Stylops melittæ*, taken at Leatherhead on April 18th. Messrs. Barrett and Turner, series of *Triphæna comes* (*orbona*) from various localities. Mr. Atkin, his very long and varied series of the same species from many localities in the British Islands, and also specimens from Asia Minor and Europe. He then read a paper entitled, "Further notes on *Triphæna comes*, with special reference to var. *curtisii*." After referring to his previous paper on the subject, he discussed at length the geographical distribution and variation of the species. Its range was from Syria, in the east, to the Atlantic coast on the west; and from south Sweden and the neighbourhood of Moscow, in the north, to the southern shores of the Mediterranean Sea on the south. Great Britain was its extreme north-west limit, and here occurred the greatest variation. In Asia Minor the specimens were of a uniform clay colour, the increase in intensity, both of colour and markings, being very gradual up to its extreme north-west limit in the Orkneys, where the prevailing form was the var. *curtisii*. In Scotland, the forms of variations were endless. The specimens from Scilly had scalloped transverse lines very plainly marked. He then discussed the history and distribution of the var. *curtisii*, and gave as the results of his experiments in breeding, that the species was, normally in its southern localities, continuous brooded, but in its northern limits had acquired the habit of hibernating in its larval stage. The extreme colour of var. *curtisii* may have been developed for protection, but further observations were nesessary on this point. A discussion ensued, in which Mr. Barrett, Mr. Tutt and Mr. McArthur joined.—May 14th. The President in the chair. Mr. Enock exhibited specimens of two very rare aquatic Hymenoptera, *Prestwichia aquatica*, which uses its legs in swimming and which has not been recorded since its first capture in 1865; and *Caraphractus cinctus* = *Polynema natans*, which uses its wings in swimming. Mr. R. Adkin, a bred series of *Melanippe hastata*, from Sutherland, with series of the same from Sussex and co. Cork. The larvæ of the first were fed on *Myrica gale*. The Cork series had a pale ochreous tone instead of the usual dead white ground. The southern series were very uniform, whereas the northern examples varied considerably in the black markings. Mr. Carrington, specimens of *Helix aspersa*, var. *exalbida*, from Devizes, and made remarks thereon. Mr. Barrett, series of *Abraxas ulmata* and *Pieris rapæ*, var. *cruciferarum*, from Japan. The former were of the British type, but the latter equalled *P. brassicæ* in size, had a considerable suffusion of black from the base, and in some of the females a partial fusion of the spots. In the discussion which ensued it was suggested that it might be the result of abundance of succulent food. Mr. Carrington remarked on the hardy constitution of the species in Canada, where, during its cycle of life, it experienced extremes of temperature from 60 degrees below zero to 138 degrees Fahr. Mr. Tutt noted the oscillation in abundance and rarity of *P. rapæ* in America, where it had survived after a great struggle with a closely allied indigenous species with which it was supposed to have interbred and which was now very rare. Mr. Tutt, for Mr. Merriefield, a number of specimens of butterflies, bred under various degrees of heat and cold: *Aglais urticæ*, *Pyrameis atalanta*, *Euvanessa antiopa*, and *Gonepteryx rhamni*. He described the variations in detail, and remarked that it was mainly the upper sides which had been affected, whereas the under sides, which in the Rhopalocera were developed for protection, were but slightly influenced. *Tryphena orbona*, var. *curtisii*, and these species were not parallel cases of variation, as in the former it was the upper side that was projectively coloured. Mr. Clark, living Entomostraca parasitic on sticklebacks, with a microphotograph, × 30, of the same, the organs of attachment being well shown. Mr. Step sent for

exhibition specimens of *Glaux maritima* and *Silene maritima*, and contributed notes on their specific characters, structure, habits and time of flowering, adding a suggestion that botanists should pay attention to the time of flowering of our British flora with the view of correcting the innumerable errors in botanical works of the day. Mr Tutt read a paper, entitled "Is cold the cause of melanism in Scotch specimens of *Tryphœna orbona?*" in which he showed by magazine references, that the area of distribution of *T. orbona*, var. *curtisii*, was by no means the coldest portions of the country, and that there the sallows flowered quite as early as in the south of England. He was of opinion that the variation was wholly brought about by utility, that the species was protectively coloured. In the subsequent discussion several members considered that the dark variation in this species was a return to an ancestral form, and that every evidence showed that the processes of evolution were still in progress.—*Hy. J. Turner (Hon. Report Sec.)*

North London Natural History Society.—Minutes of a meeting held Thursday, March 26th, 1896. Mr. C. B. Smith, President, in the chair. The curator announced a donation from Mr. Bacot of a valuable lot of Lepidoptera from our "local district." The exhibits included: Mr. Prout, a series of *Caradrina morpheus*, var. *obscura*, Tutt, bred from ova from North London; also a specimen of the flavescent Continental type of the species from Germany; also, on behalf of Miss Dale, several interesting plants from Sandown. Mr. R. W. Robbins, *Anemone fulgens*, double, showing stamens, etc., developed into petals; also two specimens of *Spilosoma urticæ*, and two of *Cidaria fulvata*, to illustrate a method of labelling. This was followed by some phenological remarks upon the early season by Misses Simmons and Nicholson, Messrs. Austin, Battley, C. Nicholson, R. W. Robbins and Woodward. Mr. Prout read a paper on the "Flora of Sandown District of the Isle of Wight." This he bounded on the north and north-east by Brading and Bembridge Down, on the south-east by the coast-line, on the south by Lake and Black Pan, and on the west and north-west by Bordwood, Youngwood and Alverstone. He gave a long and exhaustive account of the plants he had met with in the district, of which the best was perhaps *Orobanche cœrulea*, and was able to make several additions to Townsend's list. Dealing with the subject of white varieties, he remarked: "It seems to me to be very noticeable that the large majority of cases in which these white varieties appear are those of normally red, purple, or even blue flowers; and that, as they certainly occur too regularly and in too healthy plants to be attributed to mere failure of colour through any diseased or abnormal conditions, they can pretty safely be viewed as instances of reversion. Grant Allen so regards them in his little book on 'The Colours of Flowers,' and he remarks that, 'where the red and purple is very deeply engrained, as in labiates, reversion to white occurs less commonly.' From this point of view, the variable little *Polygala* (milk-wort) is at present in a somewhat unsettled condition, 'a process of modification,' pink being its normal colour, blue a progression, white a retrogression. Perhaps I need hardly remind you that it is pretty generally conceded that the genetic sequence of colour in flowers is from green through yellow to white, thence on to pink, red, and purple, and finally (the most highly specialized), to blue. Amongst the flowers at present under our notice, there is one, however, in which the white variety cannot be a reversion if the foregoing order of colour sequence is correct. This is the common broom. I have not seen the variety in question, and therefore cannot venture to pronounce upon it; but one is certainly not accustomed to expect white varieties in the yellow flowers, and where they occur, as for example occasionally in species of ranunculus, they rather present a bleached appearance which suggests to one that there is a failure of pigment, not a progression in development, in fact that they are pathological rather than phylogenetic." Mr. R. W. Robbins recorded a white variety of the viper's bugloss from Boxhill. Mr. Austin believed the raven and the peregrine falcon were still building in the island. Mr. L. J. Tremayne enquired whether *Eupithecia virgaureata* was recorded from the Isle of Wight. Messrs. C. Nicholson, Jennings and Harvey also joined in the discussion.—*Lawrence J. Tremayne* (*Hon. Sec.*)

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* sh uld be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6s. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

S. E. Hill (St. Alban's).—The little animals are mites *(Acarus)*, but too dry and broken to identify specifically.

J. Welburn (Driffield).—The plant is "field-madder" *(Sharardia arvensis)*, common among clover and corn. It appears to be harmless to cattle and sheep, even if they eat it. Some authors say they thrive upon it. It is frequently temporally abundant in cultivated fields.

E. A. Clift (Southampton).—You will find full particulars in answer to your enquiries in Dr. Knaggs' "Lepidopterist's Guide" (Cooke and Son, Museum Street, London, W.C., price one shilling). Set your butterflies and moths well forward, and not sloping down; place two-thirds up the pin, and set on a rather flat block.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

Offered, Science-Gossip, 1890-1895, "Naturalist's Journal," 1894-1895. Wanted, trilobites and Flatter's slides; in return, shells, fossils, unmounted objects, etc.—A. Sclater, Northumberland Place, Teignmouth.

A splendid series of spongiform flints, etc., from Mid-Kent, illustrating Bowerbank's "Silicious Bodies of the Chalk," in exchange for lower cretaceous polyzoa (named).—W. Gamble, 2, West Street, New Brompton, Kent.

# A NEW SHELL

## AND ILLUSTRATIONS OF SOME HITHERTO UNFIGURED HELICIDAE.

By G. K. GUDE, F.Z.S.

CORASIA LAURAE, n. sp.—Testa imperforata, orbiculate depressa, tenuis, obliquis creberrimis striis distincta, quae striis spiralibus decussantur; subpellucida, nitida, pallide coerulea; media pars anfractus ultimi vivide coerulescens, fascia lutea sub sutura ornata; spira convexa, obtusa; apex pallide lutea vel albida; sutura leviter impressa; anfr. 4½, convexi; peripheria acute carinata, pars superior paulum crenulata; anfr. ultimus antice breviter deflexus; apertura obliqua, subtrigona; peristoma simplex, tenue, margine superiori paulum expanso, gibboso, luteo, basali breviter reflexo, columellari arcuate declivi, compresso, paulum excavato, ex albido coerulescens. —Diam. maj. 19-25, min. 16-22, alt. 11-13 mm.

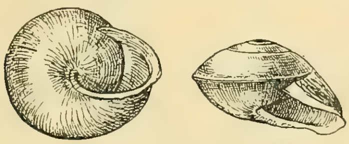


Fig. 1.—*Corasia laurae.*

Hab.—North Luzon, Philippine Islands.

Shell imperforate, orbiculately depressed, thin, obliquely and closely striate, decussated with spiral lines, sub-pellucid, shining, pale blue; the middle of the last whorl vivid blue, with a yellow band under the suture; spire convex, obtuse; apex pale yellow or whitish; suture slightly impressed; whorls 4½, convex; periphery acutely keeled, the upper side of the keel slightly crenulate; last whorl shortly descending in front; aperture oblique, subtrigonal; peristome simple, thin; upper margin slightly expanded, gibbous, yellow; basal margin shortly reflexed; columellar margin arcuately sloping, compressed, slightly excavated, bluish white.

The shell here figured was received by me from Mr. Hugh Fulton, of 216, Fulham Road, London, under the name of *Corasia psittacina*, Desh., but on comparison with the description and figure of that species, "Journal de Conchyliologie," ix., (1861), p. 350, t. 16, f. 3–5, it was evident that the two shells were distinct, and this opinion was confirmed by an examination of the specimens of *Corasia psittacina* in the British Museum collection. Although undoubtedly belonging to the phylum of *Corasia psittacina*, the characters which separate *Corasia laurae* from that species, are sufficient to warrant its being raised to specific rank, and as it does not appear to have been previously characterized, I venture to publish it as a new species. It differs from *Corasia psittacina* in having the whorls more flattened; it has an acute compressed keel which is crenulated above, while in *Corasia psittacina*, the periphery is rounded and sub-angular; the last whorl is less widened towards the aperture, more contracted behind the peristome, and abruptly descending in front; the aperture is more triangular in outline, the margins are more approximating, and the columellar margin is more arcuate and less sloping. All the specimens which Mr. Fulton obligingly showed me, six or seven in number, agreed in the above-noted characters, but, as already indicated, some variation in size was observable. This beautiful species is named in honour of Miss Laura Andrew.

### SOME UNFIGURED SHELLS.

Among the large number of shells which regrettably remain unfigured, the following—from the Philippine Islands, Marianne Islands, and Spain—amongst others, have come into my possession, and I have thought it useful to give illustrations of them.

GANESELLA CATOCYRTA.—Described by Quadras and Moellendorff as *Satsuma catocyrta* in "Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft," 1895, p. 115, as follows:—"T. anguste et fere omnino obtecte perforata, elate turbinata,

Fig. 2.—*Ganesella catocyrta.*

solidula, subpellucida, subtiliter striatula et lineis spiralibus sub lente fortiore vix conspicuis decussatula, nitens, pallide flavescens, taeniis 2, una angustiore prope suturam, altera latiore supra peripheriam castaneis ornata; spira valde elevata lateribus fere strictis, apice obtusulo. Anfr. 7, primi 5 fere plani, penultimus convexiusculus, ultimus convexior, ad peripheriam obtuse subcarinatus, basi tumidus, gibber, pone aperturam contractus, breviter valde deflexus. Apertura maxime obliqua, truncato-elliptica, peristoma modice expansum, basi reflexiusculum, margine columellari superne valde dilatato subrecurvato, perforationem fere omnino obtegente.—Diam. maj. 17-18, alt. 17·5-19, apert. lat. 11-12, long.

9·5-10·5, alt. 5·75-6 mm.—Hab. in insula Malagom Archipelagi Calamianes, leg. coll. indigena."

[Shell narrowly perforate, almost entirely covered, elevated, conical, somewhat solid, subtransparent, finely striated and decussated with spiral lines scarcely visible under a somewhat strong lens, shining pale yellow, ornamented with two brown bands, one narrow near the suture, the other wider above the periphery; spire much elevated, almost narrow laterally, apex very obtuse; whorls, 7, first 5 almost flat; penultimate whorl somewhat convex; last whorl more convex, obtusely keeled at the periphery; base swollen, gibbous, contracted behind the aperture, shortly strongly deflected; aperture very oblique, truncate-elliptic; peristome moderately expanded, base reflexed, columellar margin strongly dilated above, almost recurved; umbilicus almost entirely covered.]

I figure a specimen (fig. 2), diam. maj. 16, min. 15, alt. 17.

Ganesella apex.—Described by Quadras and Moellendorff as *Satsuma apex*, op. cit., 1896, p. 7, as follows:—"T. anguste et fere obtecte umbilicata, trochiformis, tenuiscula, pellucida, oblique striatula, lineis spiralibus sat distinctis et plicis rugulosis subtilibus oblique antrorsum decurrentibus sculpta, nitens, pallide flavescens; spira valde elevata lateribus sat concavis, apice obtusulo glabrato, fusco. Anfr. 6½, plani, sutura per carinam subexsertam filomarginata disjuncti, ultimus carina subacuta, utrimque bene exserta carinatus, antice breviter sed valde deflexus, basi paullum convexus. apertura maxime obliqua, lanceolata, peristoma superne vix, extus et basi magis expansum, basi reflexiusculum, margine columellari superne valde dilatato, umbilicum fere obtegente.—Diam. 18, alt. 14.5 mm.

"Var. apiculata (Mlldff.). Minor, paullo altior, anfr. 6, ultimus basi paullo magis convexus. —Diam. 16, alt. 13.25 mm.—Hab. in insulis Calamianes leg. coll. indigena."

[Shell narrowly umbilicate, almost covered, trochiform, somewhat thin, transparent, obliquely striate, sculptured with rather distinct spiral lines and finely wrinkled oblique folds, which are antrorsely decurrent, shining, pale yellowish; spire much elevated, sides sufficiently concave, apex obtuse, glabrous, dark; whorls 6½, flat, suture projecting from the keel, the whorls separated by a thread-like margin, last whorl sub-acutely keeled, both sides well separated from the keel, shortly but strongly deflexed in front, base slightly convex; aperture strongly oblique, lanceolate; peristome above scarcely, outwardly and below strongly expanded; base much reflexed; columellar margin strongly dilated above; umbilicus almost covered.

Var. apiculata, a little higher; whorls 6, base of last whorl a little more convex.]

I figure a specimen of the type (fig. 3), diam. maj. 18·5, min. 17, alt. 14·5 mm., and of the variety (fig. 4), diam. maj. 15, min. 14, alt. 13·5 mm.

Endodonta (Charopa) quadrasi.—Described by Moellendorff as *Patula quadrasi*, op. cit., 1894, p. 14, as follows:—"T. aperte umbilicata,

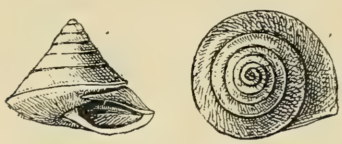


Fig 3.—*Ganesella apex.*

Fig. 4.—*G. apex* v. *apiculata.*

umbilico ⅓ diametri adaequante, discoideo-depressa, tenuis, striis transversis tenuibus, lineis spiralibus maxime confertis et plicis arcuatis sat validis distantibus sculpta, in plicis et lineis spiralibus cuticula membranacea valde decidua lamellatim obduta, fuscobrunnea; spira vix elevata apice plano. Anfr. 4½ planiusculi, infra medium sat concavi, fere sulcati, carina rotundata per plicas undulata carinati, ultimus non descendens. Apert. modice obliqua rotundato-securiformis, peristoma simplex acutum.—Diam. maj. 5, min 4·5, alt. 2 mm."

[Shell openly umbilicated; umbilicus equal to ⅓ of the diameter; depressed discoid, thin, sculptured with very thin transverse striae, very close spiral lines and rather strong distant arcuate folds, covered in the folds and spiral lines with a very deciduous membranous cuticle, dark brown; spire scarcely elevated; apex flat; whorls 4½, somewhat flat, below rather concave in the middle, almost sulcate; keel rounded, undulated along the folds; last whorl not descending, aperture moderately oblique, roundly axe-shaped; peristome simple acute.]

Fig. 5.—*Endodonta quadrasi.*

I figure a specimen (fig. 5) from Guajan Island, Marianne Islands, diam. maj. 4·5, min. 4, alt. 2 mm.

Endodonta (Charopa) fusca.—Described by Quadras and Moellendorff as *Patula fusca*, op. cit., 1894, p. 13, as follows:—"T. modice sed aperte umbilicata, umbilico ¼ diametri adaequante,

lenticularis, tenuis, striis transversis pliciformibus et lineis spiralibus valde confertis sculpta, opaca, fusca; spira parum elevata. Anfr. 4, planiusculi, infra medium subconcavi, lente accrescentes, sutura profundiuscula discreti, acute carinati, carina crenata ad suturas paullum exserta, ultimus vix descendens, basi convexiusculus, circa umbilicum indistincte angulatus. Apertura modice obliqua, securiformis, peristoma simplex, acutum. —Diam. maj. 6, min. 5·5, alt. 2·75 mm."

Fig. 6.—*Endodonta fusca.*

[Shell moderately but openly umbilicated, umbilicus equal to one-quarter of the diameter; lens-shaped, thin, sculptured with transverse folded striae and very close spiral lines, opaque, brown; spire a little raised; whorls 4, flattened, sub-concave below the middle, slowly increasing; suture deeply impressed, acutely keeled; keel crenate at the suture, a little exserted; last whorl scarcely descending; base somewhat convex, indistinctly angulated round the umbilicus; aperture moderately oblique, axe-shaped; peristome simple acute.]

The specimen figured (fig. 6) is from Guam Island, Marianne Islands.—Diam. maj. 6, min. 5·5, alt. 2·5 mm.

TROCHOMORPHA (VIDENA) BOETTGERI. — Described by Moellendorff, op. cit., 1890, p. 201, as follows:—" T. umbilicata, umbilico ⅕ diam. adaequante, depressa, discoidea, peracute carinata; solidiuscula, corneo-straminea, opaca, utrimque brunneo-taeniata, taeniis angustis a carina remotis; spira perparum elevata, subconvexa. Anfr. 5½ subplani, lente accrescentes, interdum pallidiore

Fig. 7.—*Trochomorpha boettgeri.*

discreti, striatuli, minutissime granulati, ultimus non descendens, subtus distincte spiraliter striatus, circa umbilicum angulatus, penultimo vix latior. Apertura obliqua, irregulariter triangularis, peristoma simplex, antrorsum protractus, subdeflexus, basalis bene curvatus, callosus, columellaris subreflexus.—Diam. max. 19½-20, alt. 6-6½.—Hab. in insulis Tablas et Romblon, leg. cl. J. Quadras."

[Shell umbilicated, umbilicus equal to one-fifth of the diameter; depressed discoid, very acutely keeled, somewhat solid, hornish yellow, opaque with a brown band on both sides, separated from the keel by a narrow band; spire very little raised, sub-convex; whorls 5½, sub-plane, slowly increasing, suture appressed, sometimes rather pale, striated, minutely granulated, last whorl not descending, distinctly spirally striated below, angulated round the umbilicus, penultimate whorl scarcely wider; aperture oblique, irregularly triangular, peristome simple, whitish, upper margin short, protracted in front, sub-deflexed, basal margin well curved, callous, collumellar margin sub-reflexed.]

I figure a specimen from Tablas, Philippine Islands (fig. 7), received from Herr Bruno Strubell, of Frankfort-on-Main.—Diam. maj. 18, min. 16·5, alt. 6 mm. The shell was originally referred by Hidalgo "Journal de Conchyliologie" xxxv (1887), p. 94, to *Trochomorpha conomphala*, Pfeiffer, but as stated by Mr. Pilsbry ("Manual of Conchology," ix. (1895), p. 337), the type so named, which is in the British Museum, has been examined by Mr. Ponsonby, and proves to be an immature *Obba parmula*, of which, therefore, the name *Trochomorpha conomphala*, Pfr. is a synonym.

Fig. 8.—*Pyramidula omalisma.*

PYRAMIDULA (GONYODISCUS) OMALISMA.—Described by M. Paul Fagot as *Helix omalisma*, of Bourguignat, in "Bulletin de la Société d'Histoire Naturelle de Toulouse" xiii (1879), p. 289, as follows:—"Testa latissime ad summum umbilicata, depressa, vix convexa, costis regularibus, curvatis, eleganter ornata; spira perdepressa; apice parvo, obtuso, obtusa vix mamillato; anfractibus 6, subplanulatis, lente ac regulariter crescentibus, sutura impressa separatis; ultimo non majore, ad aperturam dilatato, non descendente, supra fere plano, in medio carinato, infra convexo, tumido; apertura obliqua, transverse lunata; marginibus convergentibus; peristomate recto, simplici, acuto.—Alt. 2, diam. 6 mm.

Espèce du group des *Helix rotundata*, Muller, *abietina*, Bourguignat, etc., caractérisée par une spire presque plane en dessus, à l'encontre de ses congénères.

Au quartier de Caraman, Commune d'Avignonet."

[Shell widely umbilicated, depressed, scarcely convex, provided with regular, curved, elegant ribs; spire much depressed; apex small, obtuse, scarcely mamillate; whorls 6, sub-plane, slowly, regularly increasing, suture impressed distinct; last whorl not larger than preceding, widened at the mouth, not descending, above almost flat, angular at the middle, convex, tumid below;

aperture oblique, transverse lunate, margins approaching; peristome straight, simple, acute.]

*Pyramidula perspectiva* appears to be the nearest ally of this species, but the latter differs in having much closer and less coarse ribs, a more flattened spire, and a less impressed suture.

The specimen here figured (fig. 8) was obtained from Bruch, near Barcelona, through Mr. J. E. Cooper, of Highgate; its dimensions are: diam., maj. 7·25, min. 6·5, alt. 2·75 mm.

Westerlund ("Fauna der in der Paläarctischen Region lebenden Binnenconchylien" i., p. 11.) gives as habitat: France—Basses-Pyrenées and Dordogne; Spain—Montserrat.

Mr. Pilsbry, in "Manual of Conchology," ix. (1895), p. 341, has altered the name to *Pyramidula omalisiana*, stating the name *omalisma* to be a printer's error, but on referring to the original description, I find the name as cited above.

*5, Giesbach Road, London, N.; July 24th, 1896.*

## COMMENSALISM OF DAPHNIA AND ROTIFERS.

By Major-General Warrand, R.E.

On June 28th I was out shepherding on my farm in Nottinghamshire (a loamy clay soil in the Keuper or new red sandstone) when I saw on a small pond in a grass field a number of red patches, apparently of the blood of some animal. The red patches varied in size from half a square foot to four or five square feet. I thought that some animal must have had an accident, and asked the shepherd if any cow or sheep was missing, but it turned out that every animal of my herd was safe and in good health. It struck me that the red patches must be due to some algæ, and the next morning my man brought me a small bottle of the water, which I found to be one mass of *Daphnia pulex*, to which clung an innumerable host of rotifers very like *Pomphobyx sulcata* (fig. 2, plate xxvii., of Hudson and Gosse).

Mr. Baird (page 78 of "British Entomostraca") says: "On a sunshiny day, in a large pond, a streak of red, a foot broad and ten or twelve yards in length, will suddenly appear in a particular spot, and this belt may be seen rapidly changing its position, and in a very short time wheel completely round the pond. Should the mass come near enough to the edge to allow the shadow of the observer to fall upon them, or should a dark cloud suddenly obscure the sun, the whole body immediately disappears, rising to the surface again when they have reached beyond the shadow, or as soon as the cloud has passed over."

In my pond, however, which was only about twelve yards long and six yards wide, the red host took no notice of the shadow, or of a bottle being thrown in their midst to catch them; they were of all sizes, and packed together in an extraordinary manner, and remained in this packed state for at least three days.

The rotifers and daphnia evidently dwell together in the partnership known as "Commensalism" (see Science-Gossip, vol. iii., p. 5), the former get conveyed from place to place without any exertion of their own, and consequently find an advantage in attaching themselves to the daphnia; but often a daphnia gets overburdened by its friends, who sometimes, to the number of at least a dozen, will take the opportunity of providing themselves with an easy mode of locomotion by attaching their tails to various parts of the body of their host. When the daphnia were placed in a watch-glass several of them died, but their attendant rotifers at once attached themselves to the survivors, and, as above stated, an unfortunate daphnia might be seen together with at least a dozen *Pomphobyx*.

I was asked a short time since to send some rotifers from this neighbourhood, by post, to a friend in the south of England who is clever at mounting and preserving them by Mr. Rousselet's process. He warned me not to send Entomostracæ in the same tube as the rotifers, as the latter would get eaten by the former on their journey. So I suppose that it is well known that rotifers form to some extent an article of food for the water-fleas, and instead of being a case of commensalism, this, I think, may account for the daphnia congregating in patches, in order that each creature may destroy the tormentors of its neighbours. In the same way horses collect together when attacked by the gadfly and defend each other from the attacks of their small persecutors, by biting and rubbing each others backs, preventing the flies from settling, thus forming a sort of "mutual accommodation society."

Perhaps some of your scientific readers will be able to give a better explanation as to why the Entomostracæ should pack themselves together in the manner above stated. It was evidently not caused by a desire for sunning themselves, as stated by Mr. Baird, for they remained in much the same places for at least three days.

*Westhorpe, Southwell, Notts; July 10th, 1896.*

# VARIATIONS OF THE LEAF-BLADE.

By H. E. Griset.

NOTWITHSTANDING the numerous forces that concur in the modification of the peculiar external form of plants, a constant type is maintained for the same species so long as they exist under the same conditions. Let these conditions be changed and minute differences will be observed in the colour, size or form of the leaves, flowers, and other organs, which, if long continued, become more marked and finally give origin to those natural sub-species and varieties which seem to connect one species with another. In this article it is my intention to show some of the variations to which the leaf-blade is subject in relation to the above and other forces. The leaf-blades of many climbing and twining plants are very prone to great modification, such as the leaves of the barren stems of the common ivy, which are produced of such different shape by cultivation.

The common form of the lamina of *Solanum dulcamara*, is three-partite, the large terminal lobe being ovate, with a pair of divergent basal ones, (fig. 2); in dry places they may sometimes be found quite entire (fig. 3), and then closely analogous to the leaves of *Atropa belladonna*; and in damp and shady woods they are five-partite, or even seven-partite, as the one drawn here (fig. 4), found by the writer in a dark pine-wood in Kent; they consequently resemble the pinnate leaves of solanaceous plants like the tomato; the terminal lobe may vary from broadly ovate to narrow lanceolate.

In the black bryony, *Tamus communis*, the leaf-blade is usually broadly cordiform (fig. 6); it is not unusual to find plants in shady places with all the leaves narrow hastate, with large rounded basal lobes divergent from the mid-rib at an angle of 120° (fig. 7).


Fig. 1, large leaf of *Cratægus oxyacantha*; fig. 2, typical leaf of *Solanum dulcamara*; figs. 3-4, excessive variations of leaves of *S. dulcamara*. All two-thirds nat. size.

Some plants of *Ranunculus aquatilis* have all the leaves multifid, while others, especially in deep pools, have palmately lobed or partite floating leaves (sub-sp. *heterophyllus*). The lowest leaves are always the most multifid.

The leaves of *Leontodon taraxacum* are rather variable as to their division, sometimes being very undulated or lacinate and dentate; while at other times plants may be seen in which the lobes of the upper part are pretty regular and almost sinuate (fig. 5). A large leaf of this species I found measured twenty-nine inches in length; it was proportionally narrower than the common type of the leaf. These examples seem to point out that excessive dampness favours the sub-division (or hinders the formation of the parenchyma?) of the leaf-blade, which is well illustrated in *Ranunculus aquatilis*.

A solitary plant of *Mercurialis perennis*, growing among many others of the same species, had narrow lanceolate leaves (fig. 8).

As to size, the leaves of many plants differ greatly, according to the position they occupy on stem; those nearest the root, being largest and most divided, are the first to appear in spring, as is well seen in many poplars and the horse-chestnuts. A leaf of *Quercus robur* was 8·5 inches long, and 3·25

inches across the broadest lobes; and another of *Salix alba* measured 8·9 inches long (exclusive of the petiole which was ·7 inch), and 1·5 inches broad. In damp, shady woods I have often found the trifoliate leaves of *Oxalis acetosella* to measure 2·7 inches across. Fig. 1 represents a large leaf of *Cratægus oxyacantha*; it is 4 inches long, including the petiole, and 3·25 inches across the lowest pair of lobes.

The colouration and spotting of leaves is anything but constant; the leaves of *Ranunculus ficaria* (which are found from reniform crenate to palmately five-lobed or hederœform, and consequently resemble those of *R. hederaceus*, L.) are indiscriminately seen variegated with silvery-grey and dark-brown maculæ, with either of these colours alone or spotless.

The leaves of *Orchis maculata* and *O. mascula* are variable in the number and size of the spots, and are often spotless as well as the flowers, which are then white, in specimens growing in very shady pine-woods. The median spot of the leaves of *Lamium maculatum* are sometimes wanting; while the leaves of *Arum maculatum* may be spotless or more or less covered with minute specks or large spots, which are sometimes concave or saccate beneath. The want of light or something in the soil must be the cause of this great differentiation of colouring.

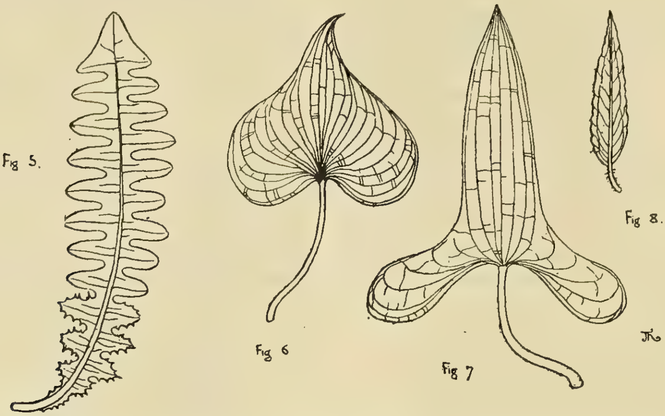



Fig. 5, sub-sinuose leaf of *Leontodon taraxacum*; fig. 6, typical leaf of *Tamus communis*; fig. 7, slender form, same species; fig. 8, narrow form of *Mercurialis*. All one-third nat. size.

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## CHAPTERS FOR YOUNG NATURALISTS.

(*Continued from Vol. II., page 101.*)

### Plant Life.

By Rudolf Beer, F.L.S.

If we analyse the life of a vegetable organism, we see that it is manifested in various ways. In the first place we notice that there is a curious balance maintained with regard to the weight of the plant, slowly but ceaselessly it is wasting away and losing weight, but just as constantly it is replenishing its loss with fresh material. These two facts present us with two features of vegetable life: on the one hand with the process of breathing, which gives rise to a loss of body substance, upon the other with the process of feeding, by which the loss is again made good. Besides this, every plant is always regulating and adjusting itself to its surroundings by virtue of what is known as its sensitiveness or irritability; and finally the plant, so to speak, has an eye for the future in that it reproduces itself either by seeds, or spores or "cuttings."

Vegetable life, then, is manifested in four ways: (1) by respiration or breathing; (2) by nutrition or feeding; (3) by irritability; and (4) by reproduction.

It requires the aid of a microscope to learn how extremely complex is plant structure, and I may add that there is a far more complicated structure underlying this again, which is, however, too fine and delicate for us to see, except by special methods. A plant has been compared to an engine, in which certain things act upon this structure which I have mentioned, and produce results comparable with the work performed by a steam-engine. There is much to recommend

this view. In the first place it is the heat from the furnace of the engine which is the ultimate source of its work. The same is true of all living things, whether plants or animals, or human beings. That we are warmer than our surroundings is an evident fact, and this warmth is generated from what we may truly describe as a smouldering fire spread over the whole length and breadth of our bodies. In this burning of our body, exactly the same gases are produced as in the burning of a candle or of a fire. It is this process of slow combustion which allows us to move, and to think, and to act; indeed, which gives us our lives. It drives us, just as the fire of the furnace drives the engine.

Precisely the same holds true for plants. It is easy to show that they are warmer than their surroundings, and that they are constantly generating the same gases as are to be found in our breath or in the vapours surrounding an ordinary fire. When a candle burns, its substance wastes away and is gradually disseminated in the atmosphere in the form of gases. This loss of substance is the invariable accompaniment of combustion, and is to be found in our own living bodies or in those of plants as much and as plainly as in a burning coal or in a lighted taper. The great distinction between the process of combustion in an inanimate substance and that going on in a living body—breathing as we there term it—lies in the fact that the former burns itself, often fiercely and quickly, entirely to invisible gases, whilst the latter, viz., the living body, has every particle it thus loses recompensated by a balancing process which is always going on side by side with respiration. We, all of us, are familiar with the sensation of hunger. This is Nature's means of telling us that we have lost as much of our bodily material as is good for us, and that we must now by some means restore what we have lost. I need not add that this restoration is effected by the process of feeding. In plants, likewise, the phenomenon of feeding or nutrition is the agent balancing the loss of substance undergone in breathing.

It is to this characteristic and important phenomenon of living things, as we find it in the vegetable kingdom, that we must now turn. Since we have seen that nutrition is the factor restoring the plant body to its original weight after this has decreased through the necessary processes of respiration, it is evident that in seeking the nature of the food of plants we have an excellent guide in the nature of the plant substance itself. Examination will show us that the chief and most important constituent of the plant body is a compound of three simple chemical elements: carbon, oxygen and hydrogen. Carbon is familiar to everyone as charcoal, oxygen as one of the gases of the air, and hydrogen as a somewhat similar gas which can be prepared from water. If a plant can obtain such a carbon-compound as this, it can readily join it to other things and build it up into its substance.

Looking at the surroundings of the plant, we see that the soil into which its roots dip is, or should be, soaked with water up to a certain limit. The air which envelops the shoot also is found to contain a certain proportion of carbonic acid gas. If either of these two things be entirely withheld the plant flags and then dies. Analysing water and carbonic acid gas chemically, we see that the former consists of hydrogen and oxygen, the latter of carbon and oxygen; in other words, that between them they contain the same three elements as the carbon-compound above mentioned as forming food stuff. Further study shows us that the water of the soil enters the plant through the hairs which clothe the root, that it then passes into a system of pipes or vessels which convey it up the stem to the leaf, and that in the tissues of this organ it meets the carbonic acid gas which has found its way from the air through the pores which cover the surfaces of the leaf. Examined microscopically, the leaf shows itself to be filled with numberless green granules, called chlorophyll grains; these have the very highest importance in vegetable nutrition, and are the cause of the green colour which foliage leaves nearly always have. As the sunshine falls upon them, these chlorophyll grains have the power of absorbing it; they act as so many little traps to the light, and just as sunlight falling upon a photographic plate effects wonderful changes in it, resulting in the production of a picture, so does this same light when caught and directed by the chlorophyll grains of the leaf, also bring about extraordinary alterations in the materials lying around and bathing the granules. These substances are water and carbonic acid gas, and the effect of this chlorophyll directed light is to bring about the chemical union of these two things to form such a carbon-compound, as I have already mentioned, as a useful food material for the plant. This compound, which first visibly makes its appearance in the substance of the green grains, is called starch; it is not quite the first substance to be formed, but it is the first which we can plainly see. It is afterwards dissolved and united with yet other things that have been absorbed from the soil, such as nitrogen and sulphur, and finally built up into the living material of the plant itself, compensating it for its loss through respiration.

I mentioned earlier in my paper that a living plant or animal in many respects resembled an engine; but we now come to a striking point of difference between the two things. The engine is rigid and inflexible, whether the air around it be warm or cold, whether in darkness or light, whether in bright sunshine or in rain, the same

work is carried out, depending only on the fire in the furnace and the water in the boiler. Living things, however, are marked off from all other objects in Nature by the remarkable power of self-adjustment they possess.

For instance, we have already seen that light is an essential factor in the nutrition of plants. Rays of a certain intensity must fall upon the green grains of the leaf; but if too much light were to meet them, their delicate mechanism would be overstrained and irreparable ruptures would take place. In living plants, however, these dangers are obviated by the wonderful changes that take place in the arrangement of the parts of the leaf in accordance with the quantity of light which falls upon them. If we examine a leaf microscopically we shall see that it is built up of a large number of infinitely small boxes or "cells" piled up side by side and one over the other, to give the leaf its outward shape. Each of these cells contains some of the green chlorophyll grains which we have already learnt to know. If now a leaf be examined which has been exposed to only moderate illumination, it will be found that the chlorophyll grains are all arranged upon the upper and lower surfaces of the cells, so that all the light which falls upon the leaf would directly meet them. If the same plant be then exposed to bright sunlight and another leaf examined, it will be noticed that the green grains have all travelled away from the upper and lower surfaces and are now drawn up along the side walls of the cells, so that only a minimum of light can fall upon them, and they are protected from the harmful effects of a too intense illumination. This is only one of many changes that are effected in the plant body by alterations in the degree of light.

Again, another remarkable adaptation to circumstances is shown by the tendrils of climbing-plants. It is the duty of these structures to cling to rigid supports, and so raise the slender stem of the climber high up into the air and light. If you carefully watch a tendril—for instance that of Tacsonia—you will see a strange phenomenon taking place under your eyes. As the tendril grows out from the stem, it continually sweeps round and round in an ever-widening circle, seeking as it were with blind eyes for some support to which it can cling, groping like a man in the dark for something to guide its progress. "It was an interesting spectacle" says Charles Darwin, in his work on "Climbing Plants," "to see the long tendril sweeping this grand circle, night and day, in search of some object round which to twine."

With regard to the cause of this movement, I need only say that it is due to the unequal growth of the different sides of the tendril, so that its apex points to each direction of the compass in turn. If such a tendril be gently pressed or rubbed at any point, it at once evinces its sensitiveness to contact by bending vigorously and rapidly at the point which was touched. In nature the same thing occurs: as the tendril revolves it will, under favourable circumstances, meet with some external object, such as a branch or piece of stick, which by reason of its mere contact causes the tendril to bend at the point of meeting, and so gradually to wind itself round the object.

These two examples must suffice to illustrate the manifold and strange phenomena of sensitiveness or irritability in plants. Everyone is acquainted with that other example of a plant sensitive to contact or touch, the famous sensitive plant, *Mimosa pudica*, which has been referred to by botanists till we are almost weary of its name, which is so dear to the hearts of the unscientific and which has been immortalised in the noble verses of a great English poet. Perhaps less familiar, but no less truly present, is the power of adaptation possessed by living plants to changes of temperature, to the direction of the force of gravity and to the other forces of nature; but beyond these references space will not permit me to go.

To complete our picture of a living plant, some account should here be given of the processes of reproduction by which the plant, after its own death, can yet continue to produce its kind. This subject, however, would take us far into the theories and facts of microscopical science. We must be content, therefore, with a brief statement of some of the more obvious points which can be seen with the naked eye. A flower, as I need hardly tell you, consists, from without, inwards of sepals, of petals, of stamens and of a pistil. The stamens are packed with small grains of pollen and within the pistil lies the germ of a future seed, which, however, cannot develop unless pollen, preferably from another flower, has first fallen upon the pistil. We may well ask how is it that the pollen from the stamens of one flower is brought to the pistil of another? Thanks, more particularly, to the work of our great countryman, Charles Darwin, we can almost completely answer this question. It was found that the most important agents in this tranference of pollen are the wind and insects.

In the springtime, clouds of pollen are swept up by the wind from the pine-trees or from the willows, and some of this immense quantity must almost inevitably be borne to the pistils of other flowers. When the pines are in bloom, almost everything indoors and out, even far from their neighbourhood, becomes dusted over with some of the pollen, and the appearance is spoken of as "sulphur rain."

Far more potent, however, than the wind, are insects; the bee buzzing from blossom to blossom has time after time been seen, with its hairy body, to transfer the pollen from stamen to pistil, and

the honey-glands which most flowers possess are thought to have originated for the sole purpose of attracting insects. In some orchids in particular, long-tongued moths are the carriers of pollen; in a few American plants, small humming-birds have been found to be the agents; and quite recently bats also have, in one case, been found to carry the pollen from flower to flower.

When we study the structure of flowers in this light, it is wonderful how every part seems to be fashioned and set forth as a lure to insects, the gaudy colours of the petal, the sweet scent of the bloom, the delicious honey of the nectary, all appear but as contrivances for this one end. Insects too seem to be to some extent formed so that they can fully benefit by the enticements held out by the flower. Altogether it is a wonderful association between two different and remote classes of living things, a partnership more perfect than anything we know in our human lives, and it presents us with a picture whose beautiful harmony makes a pleasing and suitable close to our subject.

*Elmwood, Bickley, Kent; April 5th, 1896.*

## SCIENCE AT THE NATIONAL PORTRAIT GALLERY.

By John T. Carrington.

(*Continued from page* 39.)

### Sir David Brewster (1781-1868).

THE celebrated natural philosopher, David Brewster, was a younger son of James Brewster, rector of the Jedburgh Grammar School, where David was born on December 11th, 1781. Though his mother was a highly-cultured woman, she could not have exercised any great influence upon forming the character of her talented son, for she died when he was barely nine years old. The father's rule in the house was far from conducive to the development of talent, for its rigid severity would have been more likely to crush out any budding ability. The elder and only sister of David Brewster soon discovered his genius, and, though only three years his senior, did all in her power to foster it in her brother. The remaining three brothers, James, George and Patrick, were also clever, the latter becoming an eminent preacher connected with the Abbey Church at Paisley.

Sir David Brewster.

Sir David's earliest teaching in scientific subjects was given to him by a self-taught astronomer and mathematician of Jedburgh, named James Veitch. Together, when David was ten years old, they made a telescope. When only twelve years old, he left the paternal charge and was placed in Edinburgh for University training, attending the lectures of Playfair, Robinson and others. Theology was the aim of his father for David's profession, and he was licensed by the Presbytery of Edinburgh, preaching his first sermon in 1804, before a large congregation. Although said to have shown signs of becoming a successful preacher, he never overcame a constitutional nervousness at appearing before his congregation. This was so severe that he had to relinquish his career in the Church and abandon his profession.

After a short tutorship David Brewster became twice an unsuccessful candidate for the Chair of Mathematics, once at Edinburgh and again at St. Andrew's. His worth was, nevertheless, recognized by both Universities, for he was made honorary M.A. of Edinburgh and LL.D. of St. Andrew's; Cambridge following with its M.A. degree. In 1807, he was appointed editor of the "Edinburgh Encyclopædia," which post he occupied for twenty-two years. In 1815 Brewster was made a F.R.S., having two years previously read his first paper, which was on "Some Properties of Light." He took the Copley, Rumford and one of the Royal Medals of that Society.

In 1816 Brewster invented the kaleidoscope, and in the following year became joint editor of the Edinburgh "Philosophical Journal," which later became "The Edinburgh Magazine," and again, in 1819, "The Edinburgh Journal of Science."

From this period for some time Brewster was most active in his scientific investigations and literary work. Still he found time to push the cause of science and art in other directions, and was largely instrumental in founding the Royal Scottish Society of Arts and the British Association, and was interested in the development of the science of photography from its earliest practice.

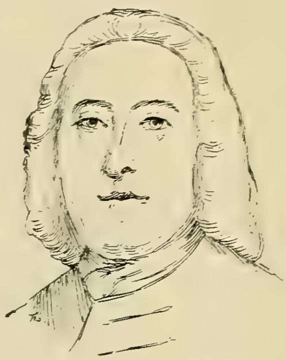
The Government allowed David Brewster an annuity of £100, which was in 1836 increased to £200, and two years later he was made Principal of the College of St. Salvator and St. Leonard, in the University of St. Andrew's, which was a fortunate circumstance for the cause of science, as it relieved him of certain financial embarrassments which were sorely pressing on his attention. In 1851 he was President of the meeting of the British Association, held at Edinburgh; the text of his address was for better scientific education, which was greatly needed in those days. In 1860 he became Vice-Chancellor of the University of Edinburgh. Besides his more important literary works, Sir David contributed upwards of three hundred papers to various scientific societies.

In 1831 William IV. sent Brewster the Hanoverian Order of the Guelph, and later conferred an ordinary knighthood, at the same time remitting the heavy fees of £109, which would have been a burthen greater than the honour. In 1810, on July 31st, appears in his diary the quaint entry, "Married, set off to the Trossachs." This was to his first wife, who died in 1850 and was buried at Melrose Abbey. He married again in 1857. Eleven years later Sir David caught a severe cold, which was more than an enfeebled constitution could throw off, and he died peaceably, at Allerby, near Melrose, on February 10th, 1868.

The portrait of Sir David in the National Gallery is a handsome life-sized figure, dressed in brown coat with black stock-tie. He is resting in an arm-chair. It is by Sir John Watson Gordon, R.A., painted in 1864, and was presented to the nation by the artist's brother.

### John Canton (1718-1772).

The name of Canton is little known in these times, even to the rising generation of students of electricity—of which subject he was one of the early masters—in these latter days of activity in electrical science. He was born on July 31st, 1718, at Stroud. Canton was always fond of scientific investigation, even in his boyhood; but, according to the customs of the times, he was "put to something useful," and apprenticed to a cloth-weaver. In 1737 Canton came to London, and articled himself to a schoolmaster in Spital Square, eventually becoming his master's partner. His investigations were still continued, and so successfully that in 1749 he became a Fellow of the Royal Society. Those were the early days of investigation into the mysteries of electricity when everything was new, and Canton was the first Englishman to confirm Franklin's discovery that lightning and electricity were identical. To those interested in electrical science, a course of reading on Canton's experiments and discoveries will be found most edifying. Though we now flippantly talk about matters electrical, we doubt whether later discoveries are so great as these early ones, for even now no one knows what is "electricity," and without the starting-points of Franklin and Canton it is doubtful whether we should now know the luxury of electric light.



John Canton, F.R.S.

John Canton wrote several important papers for the learned societies of his period, and was among the first to write popularly and correctly on science. Articles will be found from his pen in the "Gentleman's Magazine," from 1739 to 1761, and in the "Ladies' Diary," in 1739-40. He died in 1772.

John Canton superintended the fixing of the first lightning-conductor to St. Paul's Cathedral. He invented the electrometer. His portrait, which is a bust, two-thirds life size, is by an unknown artist. He is represented as wearing a coat of quaint cut and full wig.

### Joseph Grimaldi (1779–1837).

Joseph Grimaldi was born in Stanhope Street, Clare Market, London, on December 18th, 1779, and was a descendant of an Italian family who had been pantomimists and clowns for generations. His father brought Joseph up to the family profession, his first appearance being at Sadler's Wells, as an infant dancer, on April 16th, 1781, and he took a part in the pantomime at Drury Lane in the following winter. Joseph was sent, during the intervals of his engagements, to a boarding-school at Putney. As a clown Grimaldi is said to have had no equal. He died in Pentonville in 1837, and was buried by the side of his friend, Charles Dibden, at St. James's Chapel, Pentonville Hill.

Joseph Grimaldi can hardly be considered to have been a man of science. Still, his leisure time was occupied in the pursuit of entomology. It is stated that after acting in the afternoons at Sadler's Wells Theatre, he would hurriedly run to Drury Lane for the evening performance, after which, so ardent was he in his love of the country, he used frequently to walk down to Dartford Heath, so as to be there by sun-rise, in time for the first flight of the "Dartford-blues." We have not sketched his portrait in the Gallery.

*(To be continued.)*

# MOSSES AND HEPATICS OF MOURNE MOUNTAINS.

By Rev. H. W. Lett, M.A., M.R.I.A.

(*Continued from page* 31.)

THE summit of Slieve Donard, though it does not produce much for which the botanist cares, must be visited, for there are a few interesting plants to be found on it; and from it the slightly lower elevation of Slieve Commedah, 2,512 feet, on the west of the White River Glen can be easily reached by descending towards the south as far as the neck which joins the two mountains, and then going west and ascending by a gradual slope to the long, narrow ridge of Slieve Commedah. Both sides, or rather edges—for they are almost vertical—of the ridge are worth searching. The lower portions of Slieve Commedah are known as Shanslieve, Slievenamaddy and Slievenabroch, and their rocky surfaces abound with mosses and hepatics. The glen to the west of these is the Spinkwee River Glen, the water, after flowing through it, unites with the Shimna Stream, in Tullymore Park. Besides most of the foregoing, the following additional plants occur in this portion of the mountains: *Sphagnum acutifolium*, vars. *arctum*, *ascendens* and *deflexum*, *S. cymbifolium*, var. *congestum; Andreæa rothii*, var. *hamata*, *A. crassinervis* and var. *holtii; Dicranella heteromalla*, var. *sericea*, *D. cerviculata; Dicranum scottii*, *D. fuscescens*, *D. scoparium*, var. *turfosum; Dichodontium pellucidum*, var. *serratum; Onchophorus striatus; Mollia viridula; Barbula unguiculata; Grimmia obtusa*, var. *subsimplex; Bartramia ithyphylla; Sphaerocarpus palustris; Isothecium myurum*, var. *elongatum; Eurhynchium strictum*, *E. praelongum; Amblystegium riparium; Hypnum ochraceum; Lepidozia setacea; Cephalozia connivens; Cincinnulus trichomanis; Plagiochila asplenoides; Aplozia sphaerocarpa*, *A. crenulata; Marsupella emarginata*, var. *minor; Blasia pusilla.*

It may encourage botanists to be told that all the above-named plants have been found within three miles of Newcastle, and the district I have described for them embraces but a small bit of the Mournes. Doubtless other plants occur, but those only which are known have been referred to.

The plants found in other parts, which have not yet been mentioned in this paper, remain to be now noticed, and several of them have not been recorded hitherto from any other place in Ireland.

Tullymore Park, in which is a picturesque residence of the Earl of Roden, is only two miles distant from Newcastle. It is densely wooded, and some of the trees are of fine growth. The Shimna River traverses the length of the park, and the moist atmosphere which always hangs over the deep and rocky banks of the stream is conducive to the production of mosses and hepatics. The park is about three miles in length, and contains several glens. Besides most of the more common species that may be expected in such a spot, I have gathered within the boundary of the park walls *Orthotrichum stramineum*, *O. lyellii*, *O. striatum; Weissia bruchii*, *W. ulophylla* and var. *intermedia*, *W. phyllantha; Mnium rostratum; Barbula spadicea*, *B. revoluta*, *B. convoluta; Grimmia apocarpa*, a peculiar elongated green form; *Zygodon viridissimus; Neckera complanata; Homalia trichomanoides; Thamium alopecurum; Brachythecium glareosum; Rhyncostegium confertum; Plagiothecium pulchellum; Mollia verticellata*, *M. æruginosa* and var. *ramosisimum*, *M. tortuosa*, var. *augustifolia; Lejeunia calcarea; Phragmicoma mackaii; Cephalozia sphagni; Tricholea tomentella; Blepharostoma trichophylla; Pellia calycina; Asterella hemispherica; Aneura pinnatifida; Metzgeria conjugata*, *M. furcata.*

After the places already mentioned, I think the north-west region of the Mournes is the most interesting for the cryptogamic botanist. This can be best explored from Hilltown, a village where comfortable accommodation can be had at the "Downshire Arms." This place is called from Hill, which is the Marquis of Downshire's family name, and not, as some have supposed, from its propinquity to the hills of the Mournes. Several rare mosses occur near Hilltown. I found it a particularly good district for *Sphagnaceæ*. Making Hilltown my headquarters, I have easily visited, in a few days, the Cock and Hen Mountains, the Deer's Meadow, Pigeon-rock Mountains, Butter Mountains, Spelga, Spaltha, Kinahalla, and many others, all within a reasonable tramp. These produced the following additional plants: *Sphagnum squarrosum*, var. *teres*, *S. cuspidatum* and var. *plumosum*, *S. molle* and its var. *mulleri*, *S. tenellum; Andreæa rothii*, *A. falcata; Anisothecium rubrum*, *A. rufescens; Grimmia orbicularis; G. canescens*, var. *ericoides; Tortula subulata; Cinclodotus fontinalioides; Hypnum resupinatum*, *H. stramineum; Homalothecium sericium; Pleurozia purpurea; Cephalozia divaricata; Scapania uliginosa; S. umbrosa; Chiloscyphus polyanthos; Plagiochila spinulosa; Jungermania pumila; Aneura multifida.*

The Deer's Meadow, in which the River Bann rises, is a plateau at a very considerable elevation in the bosom of the mountains. The name was probably given to it as being the haunt of the red deer in the days when there were such animals in the district. Another name by which it was called, was the "King's Meadow," because people had their grazing in it free. It extends some two miles in length and one and a-half in breadth. A century back great numbers of poor persons

resorted to it in the summer months to graze their cattle. They brought with them their wives and children and a few articles of household utensils and furniture, erected huts of sods, cut their peat fuel for the coming year, and spent two months in the Deer's Meadow, retiring at harvest to their lowland habitation. This place is now utilized for making turf or peat, in which process a large portion of it has been 'cut out,' the bare rock being reached. The one road that traverses the Mournes runs through the Deer's Meadow from north to south. The additional mosses that have been collected here are: *Sphagnum intermedium* and its var. *pulchrum*, *S. subsecundum*, var. *auriculatum*; *Campylopus flexuosus*, var. *paludosus*, *C. setifolius*; *Tortula muralis*; *Barbula rubella*; *Splachnum ampullaceum*; *Breutelia chrysocoma*; *Bryum cæspiticium*; *Fontinalis antipyretica*; *Hypnum exannulatum*.

The Cove Mountain where there is a small lakelet and a sort of cave, the Happy or Silent Valley which is shortly to be converted into an immense reservoir for the water supply of the City of Belfast thirty-six miles distant, Lough Shannagh, the Chimney-rock Mountain, Slieve Bernagh, Slieve Bignian, and Bencrom, with others lying near the centre of the district, can be reached from Newcastle, Hilltown or Kilkeel. They will reward a search with *Polytrichum gracile*, *P. attenuatus*; *Sphagnum subsecundum*, var. *obesum*; *Splachnum pedunculatum*; *Barbula curvirostris*; *Frullania fragifolia*; *Aplozia riparia*, *A. hyalina*.

In walking from Hilltown to Rosstrevor, my plan has been to take to the mountains, about two miles from the former village, and work the ground from the Rocky Mountain to Shanlieve, both of which are good, and then to rejoin the road at a distance of three miles from Rosstrevor, or keep southwards till one reads the summit of Slieve Dermot, below which lies the village of Rosstrevor. There are several excellent hotels in Rosstrevor, which is connected by a tram with the railway at Warrenpoint.

If it were for nothing else but the scenery of Carlingford Lough, the botanist should visit Rosstrevor, which nestles in a sunny, well-sheltered corner on the very shore of the Lough. Here is to be seen a phenomenon not at all common in Ireland, viz., fine oak and ash trees growing at the verge of the sea, and actually in one spot overhanging the salt-water at full tide.

The mountains that rise above Rosstrevor, and screen it completely from the north and east, are all worth searching, while Knockbarragh, Moygannon Glen, Narrow Water Demesne (which is the only place where I was not permitted to carry a botanical vasculum) and Warrenpoint, are all close at hand, and possess their peculiar plants. In addition there is the great Carlingford Mountain in co. Louth, with its rugged outline and legends of giants and fair ladies, and the co. Armagh Mountains, which I have found very good for a few days' botanizing. The following from these places are not included in any of the above lists: *Tortula aloides*, *T. montana*; *Barbula fallax*; *Orthotrichum saxatile*; *Physcomitrium pyriforme*; *Fontinalis squammosa*; *Cryphea arborea*; *Dichodontium pellucidum*, var. *fagimontanum*; *Hypnum fluitans*, *H. patientiæ*, *H. scorpioides*; *Amblystegium serpens*; *Brachythecium salebrosum*; *Hylocomium brevirostre*; *Pleuridium subulata*, *P. alternifolium*; *Lepidozia reptans*; *Jungermania porphyroleuca*, *J. ventricosa*; *Leptoscyphus interruptus*, var. *pyreniacum*; *Radula complanata*.

Though I do not presume to think I have "worked out the botany of the Mourne Mountains," to quote the words of a writer in SCIENCE-GOSSIP, I think I have made good the proposition with which I started, that there is a wealth of mosses and hepatics in the Mournes.

I have to thank Messrs. A. and C. Black for permission to reproduce part of the map of Mourne Mountains, taken with their permission from their "Guide to Belfast, etc."

*Aghaderg Glebe, Loughbrickland, co. Down;*
*April*, 1896.

## AQUATIC HYMENOPTERA.

### DISCOVERY OF MALE PRESTWICHIA AQUATICA.

By FRED ENOCK, F.L.S., F.E.S.

IT is with no small amount of pleasure that I am now able to report the discovery of the hitherto unknown male *Prestwichia aquatica*, Lubbock, which I captured last week. The many days spent year after year in searching for this strange aquatic parasite were all forgotten in the excitement, as well as were the gnawings of hunger and the longing for "the cup that cheers but not inebriates." My companions in distress were Messrs. Scourfield and Dennis, and they had been holding a quiet discourse on the advisability of looking out for a place where this refreshing cup might be obtained, when I took another dip, going through the oft-repeated operation of searching over the contents of my net, until my eye rested on a minute insect, which I most carefully bottled, and then, when corked, I informed my companions that "I had got it." The effect of these words was most marked, for my companions forgot their thirst and hunger in their desire to help me to dip and examine each bottle of water. Soon a tiny insect was seen on the surface—a mere mite, with wonderful power to elude the mouth of the phial, and when at last it did go in, we hardly knew where it had gone to, but found it holding on fast to the inside, scarcely visible in the declining light. It was safely secured; then another suspicious-looking one soon after followed. We now agreed to

"limber up," and go in search of something for the inner man, but our first application met with the answer "too late!" though more successful at the next establishment, where we soon lost our appetites and just managed to catch a late train home, and the microscope was brought into requisition to determine the character of the suspects. Two of them proved to be females, and the others the insect so long and laboriously searched for, the male of *Prestwichia aquatica*. It is anything but "the better half," being a small flea-like creature, barely three-quarters of a millimetre long, and, as I surmised in SCIENCE-GOSSIP, *ante* p. 41, *apterous*. It is of a brown colour, the antennæ are similar in shape and in number of joints (seven) as those possessed by the female. The tarsi, three joints, thus confirming the opinion of the late Prof. J. O. Westwood (Linn. Trans. second series, vol. 1, "Zoology," p. 588, first line).

It is almost too early to express an opinion as to the host of this aquatic parasite, but from the comparative delicacy of the legs, and great length of the ovipositor, I incline to think we shall find it parasitic in some of the quiescent pupæ rather than the eggs or larvæ of aquatic insects. So very little is known of the habits and economy of these animals that we must be prepared to have our nerves shaken by some new facts turning up in the course of our investigations, and I cannot too firmly impress upon all naturalists the very great importance of making most careful drawings and descriptions, to avoid errors being promulgated and handed down from generation to generation.

21, *Manor Gardens, London, N.*; *July 10th*, 1896.

## FORMULATION OF SHELL-BANDS.

CONSIDERING the ease with which a collection of British five-banded land-shells may be made, and the interest and beauty of such a collection, the wonder is that more persons do not enter upon the study. Perhaps this is to be accounted for by the difficulty of hitherto obtaining a convenient check and label-list, with instructions how to proceed. It is a study which would repay investigation, for little has been systematically done.

The subject has now been made easy by the compilation of such a list ("A Label-List of the Varieties of the British Five-banded Landshells, with the Band Formulæ for *Helix nemoralis* and *Helix hortensis*," by John T. Carrington.) This twelve-page pamphlet supplies a long-felt necessity for shell collectors who, like Mr. Carrington, have made the subject of band variation a special study. The nomenclature of varieties followed is that of the Conchological Society's list of 1892, with some varieties added, not that this exhausts the number of varietal names published; for instance, not one of the seven varieties mentioned by Mr. T. D. A. Cockerell in the "Nautilus," iii. (1890), p. 139, is included, although, with the exception of var. *subglobosa*, Binn., they are all stated to occur in Europe, and probably in Great Britain. Mr. Carrington has, perhaps, exercised a wise discretion in reducing the number of varieties, as many undoubtedly are merely mutations or monstrosities.

Several attempts have been made to classify and catalogue the different combinations of bands, as observed in these two species of *Helix*. Some of the more noteworthy are: G. von Marten's "Ordnung der Bänder an den Schalen von Landschnecken," (1832); J. Sauveur in "Memoirs Soc. Mal. Belge," ii. (1867), p. 59; F. Reibisch, "Allgem. Deutsch. Naturh. Zeitung," N.F., i. (1855), p. 283; S. Clessin, "Jahrb. Augsb. Naturh. Ver.," xxii. (1873); Max Kunze, "Nachr. Bl. Deutsch. Malak. Ges.," xi. (1879), p. 55; C. Ashford, "Journ. of Conchology," iii. (1880), p. 89; C. Riemenschneider, "Nachr. Bl. Deutsch. Malak. Ges.," xiii. (1881); S. S. Pearce, "Journ. of Conchology," vi. (1889), p. 123; T. D. A. Cockerell, "The Nautilus," iii. (1889), p. 75; G. K. Gude, "The Field" (1891); T. D. A. Cockerell, "The Nautilus," viii. (1894), p. 92; and many others of minor importance.

The system adopted in the list now under consideration is a decided improvement on its predecessors, as any given formula can be found without the slightest difficulty, and, speaking from experience, this is more than can be said of any of the other lists. The whole being printed on one side of the paper only, it will be found to form a handy label-list for practical purposes as well as an exchange list to circulate among conchologists. The low price of one penny brings it within the reach of the poorest collector of land-shells.

We note with a sense of pleasure that this list is remarkably free from blemishes, which—remembering the quantity of numerals used, each species numbering eighty-nine formulæ—is saying a good deal. In looking through it and checking it with the writer's own list in "The Field" of 1891, we have found only two misprints, *i.e.* of *Helix nemoralis*, the first formula of 4 bands in 3 should read 4 bands in 2, 0(23)(45); and of *Helix hortensis*, after the last formula of 4 bands in 2, one is omitted, *i.e.* 4 bands in 2, 0(23)(45), while 4 bands in 3, 023(45) occurs twice, and one should therefore be deleted.

On the second page of this pamphlet are full though simple instructions for studying the band formulæ. We have no hesitation in cordially recommending this list to all conchologists interested in this subject.

G. K. GUDE.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*Continued from page* 43.)

## The Lime.

THERE are in Britain three different forms of lime-trees; whether distinct as species, or whether modifications of one single species, is a question which is not here discussed. They have varying claims to be considered indigenous, and the names by which they have been usually known trees are found in the size and clothing of the leaves and the proportionate length of their stalks, and also in the shape, size and texture of the fruit. The arrangement of the leaves on the stem and the position of the flowers are alike in all, and it is with these that we are chiefly here concerned.

Small-leaved Lime, *Tilia parvifolia*, early summer state.

to British botanists are (1) *Tilia parvifolia*, Ehrh., the small-leaved lime, the most truly wild form, as it is pretty certainly a native in various woods in the southern and south-western counties; (2) the common lime *Tilia intermedia*, D.C., which exists chiefly, if not altogether, as a planted tree; and (3) *Tilia grandifolia*, of Ehrh., the large-leaved lime, which, although often planted, is met with in some localities, such as the rocky limestone woods of the Wye Valley (Gloucestershire and Herefordshire), where it is difficult to believe that it can be other than a native.

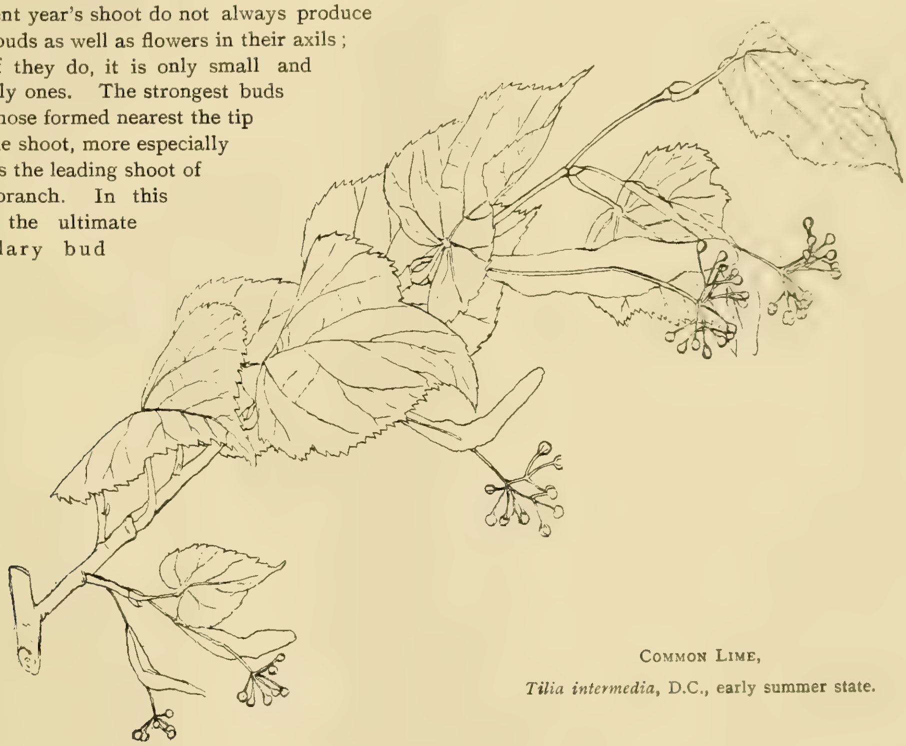
The botanical differences between these three

The arrangement of the leaves in the lime is the same as in the elm and in the beech, *i.e.* two-ranked, each third leaf standing immediately over the first, and hence giving rise to a two-ranked order in the secondary branches.

The flowers, which are borne in small stalked pendulous clusters (cymes), spring not as in the elm, immediately from axillary buds on the previous year's wood, but from leafy shoots of the current year arising from those axillary buds; they thus belong to a younger order of growths than in the case of the elm. The axil of every leaf, or nearly every leaf save the lower ones, on these

shoots give rise to a cluster of flowers, and also to an accompanying leaf-bud. An arrangement which I think is peculiar to the lime is this formation of a leaf-bud in the same axil with the inflorescence. Hence it arises that when the fruit is ripened and falls off with its stalk, the node or joining does not exhibit a bare space as in the elm or ash, but a bud ready to produce a leafy shoot in the following spring. Thus the ultimate branches of the lime are often more furnished with sprays than in the elm or beech; and as these sprays do not show a tendency to turn upward, the flat fan-like mode of growth is in general very observable.

It has been said that the lowest leaves on the current year's shoot do not always produce leaf-buds as well as flowers in their axils; or, if they do, it is only small and weakly ones. The strongest buds are those formed nearest the tip of the shoot, more especially if it is the leading shoot of the branch. In this case the ultimate axillary bud takes the office of the growing-point, as in the elm, and in the following season carries forward the branch in the same direction as before, whilst the lower axillary buds give rise at the same time to leafy flower-bearing shoots, which fringe the leader throughout the length of its last year's growth. The leading shoot of each branch, although slender, is moderately strong, and maintains a horizontal or even ascending direction, save towards the extremity where it is weaker and drooping.



Common Lime,
*Tilia intermedia*, D.C., early summer state.

The perishing of the growing-point of the year's shoot in autumn and the devolving of its office on the nearest axillary bud does not seem to have been noticed in the case of the lime, but it may readily be seen, on examining a healthy twig in winter, when it will be found that the bud at its tip has been formed in the axil of the uppermost leaf, and the scar left by that leaf on falling may be seen at the base of the bud on one side, whilst on the opposite side may be observed a smaller scar, which marks the position occupied, either by a stalked cluster of flowers or by the growing-point before it withered away. This contributes to a zigzag direction in the shoot as it lengthens. The angle which the older branches make with the main trunk is commonly less than forty-five degrees. The divergence of the lesser branches and of the ultimate sprays from their parent branches is usually much greater than this. The length of internode varies from one and a-half to two and a-half inches in vigorous shoots, whilst on the small spray wood it is often no more than half an inch. In the luxuriant shoots again, which often arise from the base of the stem, it will sometimes be found to be as much as four inches.

In the general character of its branching it shows some similarity to the more slender-growing forms of the wych elm, as might be expected from the identity of their leaf arrangement. But the branches of the lime show more subordination to the main trunk, and, as has been already pointed out, they maintain more distinctly the flat fan-like form; then, as they extend and lengthen and their

increasing weight renders them more and more pendulous, they fold over each other and form too unbroken a surface for picturesque beauty, and hence Gilpin's remark that the lime-tree "has an uniformity of surface without any of those breaks and hollows which the most picturesque trees present, and which give their foliage so much beauty." This, however, is less the case as the tree advances into old age, the gradual lengthening of the branches, and the dying away of their lower branchlets and spray contribute to a greater variety of surface and lightness of effect.

What has been said in this paper must be understood to apply in the first instance to the wild or small-leaved lime *T. parvifolia*, Ehrh. The general mode of branching is, however, much the same in the other two kinds, *T. intermedia*, D.C., and *T. grandifolia*, Ehrh. The differences in the general effect of the two latter trees from that of the former is due in some measure to their more robust growth in all parts, but more particularly to the larger size of the leaves and their comparatively shorter stalks, on account of which the leaves tend more to overlap each other and to give a dense and crowded aspect to the young shoots compared with the more light and open growth of *T. parvifolia*. In neither of the limes, however, do we observe that diminishing of the leaves towards the tip of the young shoots in early summer which has been spoken of as characteristic of the beech.

*(To be continued.)*

## A RAMBLE IN EAST ANGLIA.

A FINE day and a sky deep blue saw me on a ramble round Hawstead, a village which Queen Elizabeth visited near the once-famous town of Bury St. Edmunds. Soon being in the country, with the call of the cuckoos keeping me company, I began my search in quest of plants. I was not disappointed, for soon I came across a hedge in which the wayfaring tree, *Viburnum lantana*, and numerous small green flowers of the spindle-tree (*Euonymus europæus*) played no unimportant part. Underneath these the woodruff (*Asperula odorata*) showed its little white flowers and the wild clematis (*Clematis vitalba*) wreathed the branches with its tender shoots, later to be expanded with elegant flowers.

In the adjoining field butterflies were frequent. There I have caught the common blues, red admirals, peacocks, common whites, painted lady, with others; and sometimes a beautiful swallow-tail (*Papilio machaon*) fell to my net as well.

The corn crowfoot (*Ranunculus arvensis*), with its curious and prickly seed-vessels, finds a habitat in a field there with the tiny venus-comb (*Scandix pecten-veneris*), and on a bank of a neighbouring ditch the common arum (*Arum maculatum*) and the peculiar wood-spurge (*Euphorlia amygaloides*), growing like a shrub by the side of the water, are both plentiful. A meadow a few steps further shows its treasures in the form of the green-winged orchis (*Orchis morio*) growing thickly with the cowslips, making a grand contrast. On the next road *Equisetum arvense* is so plentiful as to fill the wind with its pollen.

Soon I came in sight of one part of the village with its whitewashed houses. As my object in going to Hawstead was to get information about the locality of the beautiful and local fritillary, *Fritillaria meleagris*, I called at one of the cottages, the garden of which was full of these curious flowers, to ask for information about its whereabouts. My informer was most agreeable. "They be in the 'flowery meadow,' as the children call it, but the tenant don't like people going in, as last year they dug them up so much. It's called 'wild tulip' hereabouts because its flower is like one, but it hangs down and has roots like snowdrops. I can give you a root from my garden—they have just been planted from the meadow." Following her into a well-kept garden she said: "Last year I got a white one, and I staked it so as to know it next year," and a handsome white variety it was. Thanking her very much, I departed, and noticed that though the fritillary would probably soon be banished from the mead, it would have a good place among the cottage gardens in Hawstead for many years. In a meadow near the church, the grass was covered with the meadow-saffron (*Colehieum autumnale*) with strong clumps of leaves. It would be hardly possible to eradicate this, and the person who tried it would soon be tired, as there is such a quantity. Passing Hawstead, I soon came to a valley in which a little stream runs, called Hawstead Vale, or Hawstead Cranks, an ideal place for picnics and hide-and-seek, being full of cranky corners. The time of this visit being early in May, there was nothing particular in this place, but on past occasions I have found the following plants: the hairy violet (*Viola hirta*), abundantly on a dry bank; one good-sized plant of the perfoliate honeysuckle, with its fine yellow flowers and perfoliate leaves; oxlips (*Primula elatior*), with their fragrance and habit between a primrose and cowslip; guelder-roses (*Viburnum opulus*), growing near the water; milkwort (*Polygala vulgaris*), on a healthy meadow near; wood forget-me-not (*Myosotis silvatica*), on dry ground under shrubs; and of less local plants, I may mention chicory (*Cichorium intybus*), dogwood (*Cornus sanguinea*) and the common iris (*Iris pseudaorus*). DAVID S. FISH.

*12, Fettes Row, Edinburgh; July*, 1896.

# NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

IN the third week in March, I was dipping my net in the old fish stew at Shiplake Court, and landed six toads, all clasped together, their arms round one another's necks and bodies in a most fraternal embrace. I placed them on the grass bank, and they appeared to be perfectly torpid; after a while they lazily tried opening their eyes, and then re-shut them; then they gradually loosened their hold of each other and separated, commencing to crawl away. I replaced them in the water and shortly afterwards, in another part of the fish stew, saw a number of toads linked in a similar way, swimming away *en masse*, like a raft, moving simultaneously their outer hind legs. Query to this is—do toads hibernate thus? And if so, do they cling together for warmth or protection? There was no sort of idea of union except a fraternal one, as they appeared to be all of one sex.

The Batræhospernum weed, mentioned in my article in the July number (*ante* p. 44), showing a languishing habit when left alone in a little glass jar, despite of fresh water, I replaced some duck-weed and nitella with it, when it immediately resumed its pristine colour and healthy appearance. The question suggests itself whether it derives oxygen or any life-giving principle from other weeds. Since the great heat in June, it has languished, and now (July 2nd), was thrown away, as no longer worth keeping.

In March, I caught some curious worms, very thin, about an inch long, white colour, semi-transparent; these, when at rest, anchored themselves to the weed in a circle. On looking closely at them, one perceived they, though apparently cylindrical, had sides in the form of an octagon.

A swallow was seen and the cuckoo heard here on April 19th. On April 29th, a larva of the dragonfly *Libellula depressa*, I had in a bottle, cast its skin entirely, and when I placed the skin on a card, it was quite perfect but for one leg, which the larva had apparently swallowed. On April 27th, my husband, a friend and myself were watching some fish in a large aquarium, when we perceived a minnow swimming frantically round, attacked by what I described as a "barley-sugar animal," on page 44 of July number of this paper. The creature was plainly biting the minnow, and was firmly fixed on its back like a loop. Taking a spoon, I took out the fish, removed the enemy, and placed both in separate vessels; the fish recovered, the mysterious enemy lived, too, for a while. These barred leeches (if they are such) only live if the water is constantly changed. They are for ever on the watch, seeking something, though they are so cunning that at the least alarm or change of water they will lie round an anacharsis leaf till one imagines they are lost.

I should be so glad if some fellow naturalist would tell me of a good book on worms and leeches, also one on mites. The variety of these latter is great here. I may mention that we have several red ones, one indented like a mattress, another plain-scarlet with hard scutellum, a similar one deep crimson, one brown with yellow spots, and one black with similar spots.

The ditches now have many *Velia currens* in them. A most beautiful *Corrixa* I have lately caught occasionally has red eyes, a green chrysoprase coloured head, a green body with two stripes of brown edging, wing cases, and barred across with brown stripes. Also the very curious little whirligig beetle (*Gyrinus*), about five lines long, wedge-shaped, and like a piece of quicksilver all over.

I bought a pair of *Hydrophilus picens* beetles from Mr. R. Green, of Covent Garden, on May 30th; they feed on anacharsis and watercress, varied with a few ants'-eggs. With regard to aquaria, I find them much more difficult to keep in health and clearness in the hot weather than in the winter and spring, despite of shade and numerous *Planorbis* and other molluscs, the water is apt to get rapidly turgid and green. My old *Dyticus* beetle, caught September 27th, 1895, is healthy and will be restored to the ditches before his mistress departs for a summer holiday. Nothing comes amiss to his voracious maw, from beef, mutton, fish, tadpoles, down to an occasional water-snail or ant-egg.

The greater mullein flourishes profusely here, rearing its handsome yellow spikes of flowers in the chalk slopes above the river. These have been covered with caterpillars of *Cucullia lychnitis* this season. I have fed some dozen or so in my insectarium, and a few turned to pupæ; but to my disgust, some insect has devoured the majority of them. I suspect earwigs to be the murderers, as several have been caught in the insectarium.

On the high road to the station here, I saw a nest of the nest-building bee (*Bombus muscorum*), it consisted of a ball of moss under a few bents of dry hay; on lifting the moss with a stick, a complete nest of moss was revealed, in which arose a dome-shaped yellow cone, presumably the eggs; in the moss by this structure were two small black bees, who, surprised at such an intrusion on their domesticity, did not attempt to fly out, but exhibited an abject attitude of fear.

*Shiplake Vicarage, Oxon.*

# BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Text-Book of Zoology.* By J. E. V. Boas, Lecturer in Zoology in the Royal College of Agriculture, Copenhagen. Translated by J. W. Kirkaldy and E. C. Pollard, B.Sc. Lond. 576 pp. royal 8vo, with 427 illustrations. (London: Sampson, Low, Marston and Co., Limited, 1896.) Price 21s. net.

In preparing an English translation of Dr. Boas' "Lehrbuch der Zoologie,' which has already appeared in two Dutch and two German editions, the translators have had in view the requirements of beginners in the study. An important feature is the fact that Dr. Boas founds his book and teaching upon facts rather than theories. This is most useful to students, because they can verify much of what he says for themselves; such experiments being of the highest educational value. Having this is view, the translators have replaced in the list of more important animal forms mentioned in the book, those which are chosen from the European fauna not occurring in Britain, by other animals found here. This will add greatly to the value of the book for English readers. The literary style of the translators is well suited to beginners, as well as older students, for the book is not overloaded with difficult scientific terms insufficiently explained, the common fault with so many "text-books." Embryology very properly forms the basis of Dr. Boas's work, and he leads up from the earlier stages of each class through the life-history to classification, after giving a general description of the animals. The figures are well chosen for illustrating the text. They are generally fairly well printed, though in some cases the detail is lost in the liberal application of ink; as for instance, in figs. 44 and 223. This latest of text-books on zoology, issued to English readers, may be well recommended, and should be added to the libraries of educational establishments generally.

*The Evolution of Bird-Song; with Observations on the influence of Heredity and Imitation.* By Charles A. Witchell. 253 pp. 8vo, illustrated by musical renderings of some bird-songs. (London: Adam and Charles Black, 1896.) Price 5s.

This is one of the most thoughtfully written books we have met with for some time past. It is the work of a true observer of nature who lives among his subjects. Neither has it been too hastily written, for the author states that the investigation of bird-song first secured his attention in 1881. As is usual in such cases, it was a small circumstance which led in the first instance to this study; and in the result we have now before us a remarkable work, well worthy of the attention of the country lover as well as of the skilled ornithologist. We do not go so far as to say that we agree with every conclusion of the author, especially in regard to quoted imitations of one species of bird of the song of some other widely different one, both in species and in notes. While agreeing that individual birds do vary very much in their song, we have never, as stated by the author, heard a thrush weave into its song the harsh "crake" of a corn-crake. In the case of the song of sixteen thrushes Mr. Witchell claims to have recognized an imitation of corn-crakes no less than twenty-eight times. This instance is, of course, an extreme case; but in strongly recommending our readers to get this book and commence the observation of bird-song in their country rambles, we would warn them against too readily finding sounds which seem to be adapted from the song of very improbable birds. Birds, like other animals, are exceedingly imitative, and doubtless do acquire a strain of song peculiar to their environment by copying certain notes of other birds common in their district. Mr. Witchell has inaugurated a study of animal economy which can be readily followed by most intelligent persons; and one that will doubtless add much interest to country walks, to say nothing of the friendly discussion which is sure to be raised in consequence.

*The Scenery of Switzerland, and the Causes to which it is due.* By the Right Hon. Sir John Lubbock, Bart., M.P., F.R.S., D.C.L., LL.D. xxix. and 473 pp. 8vo, with 155 illustrations. (London and New York: Macmillan and Co., Limited, 1896.) Price 6s.

Even some of the immense number of people who annually "do" Switzerland, or other portions of the Continent, will find the perusal of this work of Sir John Lubbock's add greatly to their pleasure when passing through the Alpine regions. Those who travel for travel's sake and education, should take the book with them and compare what is therein written with the surrounding scenery. Then a new interest will be awakened within them, and every mountain and valley will appear under new vision. The wonder is that this book, or one like it, had not years ago been written for the use of English travellers. Sir John explains, with the aid of numerous illustrations, the forces which have combined to elevate the Alps, raise lakes high above the sea-level and depress the gorges and vales, also how the glaciers and perpetual snows influence the physical geography of these regions. In fact, how the earth came to assume such aspects as are there exhibited. In showing how the sciences of geology and meteorology account for the physical appearance of the surface of the world, the author writes so plainly that his work is as pleasant reading as a story-book. Where it is really necessary to use the language of science, the unfamiliar words are explained in a short glossary, so that the book is founded on the principle of geology, made easy for lay readers.

*Ros Rosarum ex horto Poetarum: the Dew of the ever-living Rose gathered from the Poets' Gardens of many Lands.* By E. V. B. Second edition. 222 pp. 8vo. (London: Elliot Stock, 1896.)

It has seldom been our pleasure to handle a more dainty book. It suggests a present for some fair lady who will wrap it in silk and keep it in a lavender-scented drawer. It is not the first of the Hon. Eleanor Vere Boyle's books which we have had to favourably notice. Her works have a delightfully pure fragrance of old-fashioned gardens, with sunny corners, where the perfume of flowers rests heavily on still summer afternoons. This is no exception, for in addition to nearly 200 pages of selected quotations about roses—damask, musk, red or white—there is an epistle to the reader which teems with rose-lore. Now, ye who would please a lady, go buy "Ros Rosarum" and give to her.

*A Monograph of the Land and Freshwater Mollusca of the British Isles.* By JOHN W. TAYLOR, F.L.S. Part iii. 63 pp. royal 8vo, with 90 illustrations. (Leeds: Taylor Brothers, 1896.) Price 6s., or 5s. by subscription.

We gladly welcome Part iii. of this fine work, and only regret that the parts do not appear more frequently. The book is so valuable that the slowness in the issue is much to be deplored, if it is not, indeed, a source of anxiety as to the ultimate date of completion. One incentive to the author to let us have the work more rapidly would be an increased subscription list, which would doubtless enable him to give more time to its production. On looking over the list of subscribers on the covers, we miss many names of those who will do wisely to support Mr. Taylor, if not themselves actually conchologists. The number of libraries should also be largely increased which include this book in their catalogues. In fact it is the duty of everyone interested in natural science to urge on the author in this truly good work. The first five pages of Part iii. completes the monograph of the "shell," and ends with a lengthy bibliography of the literature of the subject. The consideration of the "animal" is commenced and dealt with in a masterly manner. The author's treatment of the sexual organs of mollusca is among the best essays we have met with on this question—now considered so important in defining some obscure species, as well as in general classification. The alimentary system is included in this part and there are new illustrations of teeth of *Helix aspersa*, which are so interesting that we reproduce them by permission of the author. The part also contains the nervous system, auditory organs, circulatory system, and the morphology of the external organs, particularly in reference to the tentacles. This monograph still maintains its high character.


Half a transverse row of the lingual teeth of an adult garden-snail (*Helix aspersa*).

From Taylor's "*Monograph of the Land and Fresh-water Mollusca of the British Isles.*"

*The Flora of Dumfriesshire.* By G. F. SCOTT-ELLIOT, M.A., F.L.S., F.R.G.S. Pages xl. and 219, royal 8vo. (Dumfries: J. Maxwell and Son, 1896.) Price 10s. 6d., or 7s. 6d. to subscribers.

This is an important addition to the list of county floras. It has been carefully compiled by an eminent author, in which work he has been assisted by J. McAndrew, J. T. Johnstone, the Misses Hannay, G. Bell, R Service, Rev. W. Andson, B. N. Peach and T. Horne. The book is something more than a mere list of plants and their stations in the county, for there are chapters on Topography by Mr. Scott-Elliot; the Habitat, Flowering Period, Insect Visitors, The Aculeate Hymenoptera of Mid-Solway, by Mr. R. Service; Meteorology by the Rev. W. Andson and Mr. Scott-Elliot; Geology by Messrs. Peach and Horne. It will thus be seen that the flora has been studied from other points of view besides the herbarium, for all influences which regulate its existence have received consideration. The nomenclature is that of the ninth edition of the London Catalogue, but we are glad to observe that some "species" have been relegated to sub-species. The topographical range includes a portion of Kirkcudbright.

*Abstract of Proceedings of the South London Entomological and Natural History Society for the year* 1895. 107 pp. 8vo. (London: published by the Society, 1896). Price 2s.

When we consider that the compilation and editing of these "Transactions" are in the hands of a committee of members who are very fully occupied with other affairs of life, we think they are worthy of thanks for having produced this part by midsummer following the year included. We are glad to see the Society still prospers and is doing much to popularize natural history. In addition to the Proceedings which have been reported from time to time in these pages, there is Mr. Thos. W. Hall's presidental address, which carefully summarises the Society's work for his year of office. Several papers are printed in this number, which were read before the Society in 1895. These include "Variation of *Erebia æthiops*," by Mr. J. W. Tutt; "On *Colias edusa*, in 1895," by Mr. E. M. Montgomery; "Notes on Sea Anemones," by Mr. Edward Step, F.L.S.; and a useful "List of British Stalk-eyed Crustacea" by the latter gentleman, which he has compiled for the use of readers of "Bell's History of British Stalk-eyed Crustacea," the object being to synchronise the nomenclature now used with that adopted by Professor Bell. Altogether this is an interesting part of the Society's "Transactions."

*A Cosmographical Review of the Universal Law of the Affinities of Atoms.* By JAMES HENRY LOADER. 93 pp. 8vo. (London: Chapman and Hall, Ltd.) Price 2s. 6d.

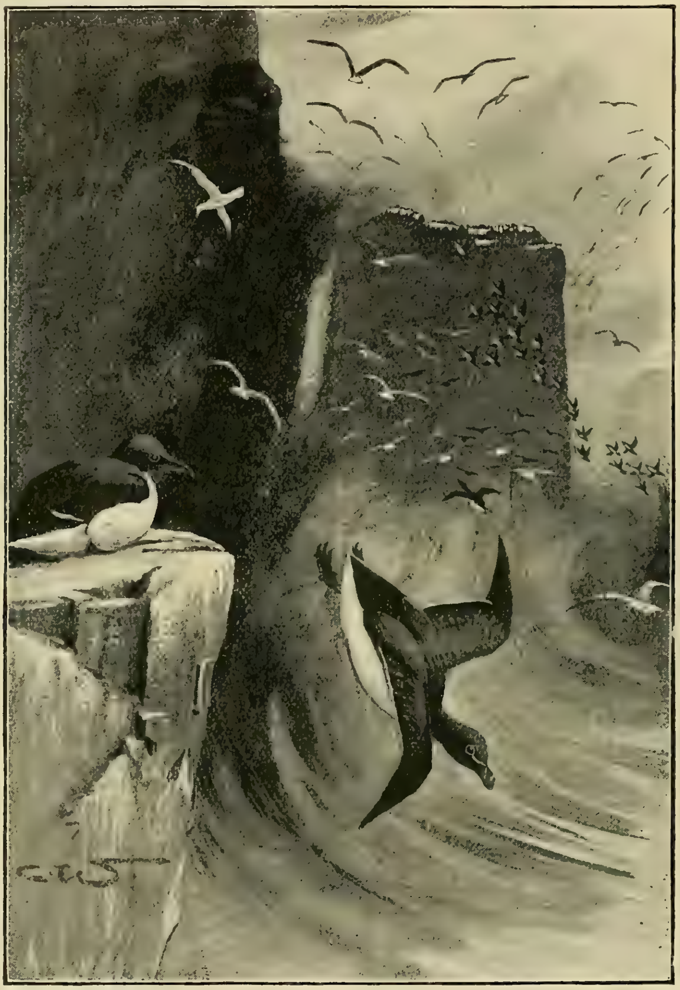
The author states that this little work can by no means fully argue his views of the atomic theory, but he gives us enough for much speculation, no matter whether we agree with him or not. What he does say is clearly put and concisely argued, and will form some thoughtful reading for those interested in the affinities of atoms.

*Shertchley's Physical Geography.* Revised by JOHN H. HOWELL, B.A., twenty-eighth edition. 224 pp. small 8vo, (London: John Murby, 1896). Price 1s.

This is one of Murby's "Science and Art Department Text-Books," and this particular one has been before the public for the past twenty years. This new edition has been brought quite up to the present condition of geographical knowledge, and the astronomical parts of the work have been re-written. There is so much that is new in this text-book that it will be found useful to those who are "cramming" for examination, and as a handy reference for general use.

*British Sea Birds.* By CHARLES DIXON. 295 pp. 8vo, with eight illustrations by CHARLES WHIMPER (London: Bliss, Sands and Foster, 1896.) Price 10s. 6d.

The temptations offered by some publishers of natural-history books are great, and more than difficult to withstand. We know many a young ornithologist who will furtively handle that spare half-guinea on seeing this work at his booksellers. To say that the illustrations are by Charles Whimper is a guarantee for their beauty and general truthfulness. By the courtesy of Messrs. Bliss, Sands and Foster, we reproduce a couple of them for our readers' inspection; it was difficult to select the most artistic, for all are alike good. The eight pictures include the black-backed gull and common tern, ruffs, guillemot and razorbill, great northern diver, tufted duck, stormy petrel, chough, and a view on Friskney foreshore in migration time, which is a night scene, with nets spread for the capture of the birds, more especially ducks, reminding one of the miles of similar nets we have seen spread along the coast of Italy, south of Naples, in the quail season. The beauty of Mr. Whimper's pictures is largely due to his appropiate backgrounds, and some of those in this book have that character to the full. We have been naturally first attracted, on taking up this work, to the pictures and the general excellence of its production by the publishers, but the letterpress will be found quite as attractive. Mr. Dixon's pleasant style and abundant information is all that the unscientific reader will desire. Altogether this is quite the book for the country house and the town bird-lover, who takes his holiday by the "sad sea waves."



GUILLEMOTS AND RAZORBILL. From Dixon's "*British Sea Birds.*"

*Modern Optical Instruments and their Construction.* By HENRY ORFORD. 100 pp. 8vo, illustrated by 88 figures. (London: Whittaker and Co., 1896.) Price 3s.

This is essentially an amateur's book, as it

describes only the more popular optical instruments in use. The author commences with a description of the human eye, and bases the remainder of his chapters upon its artificial aids. Much of the work is devoted to the theory and practice of ophthalmoscopic examination, and the use of spectacles. There are also chapters upon the spectroscope, the stereoscope, and optical lantern.

*The Story of Electricity*. By JOHN MUNRO. 194 pp. small 8vo, with 100 illustrations. (London: George Newnes, Limited, 1896.) Price 1s.

Messrs. Newnes are doing good educational work by issuing the "Library of Useful Stories," of which this volume is one of the series. Written by a fully trustworthy authority on electrical matters, we have pleasure in recommending it to those who desire to know the general facts about the modern condition of the science of electricity, without the labour of wading through heavy books. The subject is treated from the earliest times to the recent experiments with the X-rays; the frontispiece being one of the now somewhat hackneyed pictures of the bones of a hand. This little book will form a nice present for an intelligent boy.

*What it Costs to be Vaccinated: the Pains and Penalties of an Unjust Law*. By JOSEPH COLLINSON. 46 pp. 8vo. (London: William Reeves and A. and H. B. Bonner, 1896.) Price 1s.

The most satisfactory part of this book is the nice manner in which it is printed and issued by the publishers. For the rest—one can only regret that the freedom of the press can be so far misused as to permit weak-minded persons to be influenced by such literature. It makes one wish that our system of government were a little more paternal, and that such books by irresponsible writers were repressed by the strong hand of the majority of sensible people. Then we should have fewer of such epidemics of small-pox as has this year carried off numbers of useful folk in the West of England. These pages are covered with the usual stock arguments against vaccination, and we look in vain for anything new to show the necessity of its issue.

*A Concise Handbook of British Birds*. By H. Kirke Swann. 210 pp. 8vo. (London: John Wheldon and Co., 1896). Price 3s. 6d.

Without going too critically into the question of the necessity for more small books on the British birds, we welcome Mr. Swann's handbook. Its chief merit is its conciseness, which is an advantage to the reader who knows something of ornithology, but desires to look up some bird fact. We are not quite sure whether this aiming at brevity has not cut the book too far. It might have been well to have added a few more sheets to its bulk, especially considering its price; then opportunity for including more useful information would have been secured. With regard to the nomenclature used, the author states that "the classification and nomenclature practically accord with those of the 'List of British Birds,' compiled by a Committee of the British Ornithologists' Union (1883), but a number of necessary alterations have been made, particularly in the matter of adopting the specific names of *first* describers as far as possible." We feel sure that most of his readers will be delighted.

THE STORMY PETREL. From Dixon's "*British Sea Birds*."

# SCIENCE GOSSIP

NATURAL science not yet being one of the subjects necessary for the qualification of a newspaper editor, we were not surprised to see a true "scientist" stating in a recent issue of "The Irish Times" that the Giant's Causeway consists of a multitude of fossil palm-trees packed closely together.

DR. BOWDLER SHARPE has undertaken to complete the almost finished monograph, left by the late Henry Seebohm, on the "Family of Thrushes." The work will be issued as a limited edition of two hundred and fifty copies, by Messrs. Henry Sotheran and Co., of London, and contain about one hundred and fifty coloured plates.

WE gather from the Report for 1895 of the observatory at Bidston Hill, near Birkenhead, some interesting statistics and conclusions about storms and wind velocity at the mouth of the Mersey. One fact will be a revelation to many good Liverpudians, viz.: that the annual average of stormy hours in the district reaches only about sixty.

LOVERS of nature and scenery are just now especially indignant at the proposal of a syndicate of speculators to enclose and make a show of the Giant's Causeway, in North-eastern Ireland. It is possible that public opinion, backed by certain ancient manorial rights, has saved that grand geological station from the desecration of swing-boats and steam roundabouts, to say nothing of the "American switchback" and attendant "trippers."

IN consequence of his now working upon other groups of Insecta, Mr. C. A. Briggs, of Leatherhead, has decided to place his magnificent collection of Lepidoptera in the hands of Mr. Stevens, of Covent Garden, who will offer it for sale by auction during the coming autumn. The sale will occupy several days; and we hope, before it occurs, to give some account of the rarer species and varieties contained in the collection.

WE are glad to observe from the blue book, just published, containing an account of the British Museum for the financial year ending March 31st, 1896, that the number of visitors to the Natural History Department in Cromwell Road, was the highest for any year since 1890, the total being 446,737. The Natural History Department is evidently becoming popular as the general public grow more familiar with the site of the Kensington Museum.

A PARLIAMENTARY paper has just been issued upon signs and tests in the Mercantile Marine, which announces some startling results in examination of ships' officers for colour-blindness. The new system of test which has been adopted, gives 2·8 per cent. of failures, as against ·88 per cent. by the old system. No less than fifty-three officers who held certificates under the old system failed to pass the new. We wonder what is the percentage of students of natural science who would fail to pass this examination.

THE Astronomer Royal has been elected a foreign correspondent of the French Academy of Science.

PROFESSOR STORY-MASKELYNE, of Oxford, is to be honoured by the presentation of his portrait, which is being subscribed for by his admirers in recognition of his labours in mineralogical science.

THE Local Committee for carrying out the arrangements of the British Association Meeting to be held this year in Liverpool, have their affairs well forward, and it will not be the fault of the Committee if the meeting is not a great success.

THE cuckoo and its foster parents formed the basis of an annual presidental address read before the North Staffordshire Naturalists' Field Club, by Mr. W. Wells Bladen, on March 19th. A reprint of his paper has been sent to us.

THE American Association of Economic Entomologists will hold its eighth meeting at Buffalo, N.Y., on Friday and Saturday, 21st and 22nd of August. The meeting of the American Association for the Advancement of Science commences on August 24th, in the same city.

IN the Report of the Guernsey Society of Natural Science and Local Research for 1895, we find a table of the sunshine for the year in the island. It is easiest to understand what this means, by taking the summary of sunless days; which are eight in January, six in February, two in March, one in April, none in May, June, July, August, or September, five in October, nine in November, nineteen in December, or 315 days in the year on which the sun shone.

THE Duke of Bedford has given to the Technical Instruction Committee of the Bedfordshire County Council, free of rent, the use of a farm of two hundred and seventy-five acres, for experimental purposes. In addition, he has provided lecture-rooms and other buildings for the accommodation of twenty resident students. By this munificence twenty boys at a time, holding free scholarships of the Council, will each reside for two years, and be instructed in the science of farming.

SIR WILLIAM H. FLOWER, the Director of the Natural History Museum, recently communicated a letter to the "Times" protesting against the prevailing fashion adopted by cultured ladies of the higher social classes of wearing in their millinery egret plumes.

SIR WILLIAM FLOWER states that these people are in some instances members of the Society for the Protection of Birds, and in most cases are ladies who would shrink from any act of cruelty. They are, however, states Sir William, persuaded by fashionable milliners that these egret plumes are artificial, but all he has examined are the real feathers.

IT is possible that in a very few instances the powerful protest entered by a gentleman of Sir William's position may stop the use of these feathers in millinery, but no protest short of an Act of Parliament making the wearing of wild-birds' feathers penal will stay their extermination. The fact is the milliners are helplessly in the hands of the wholesale trade, who dictate in the first instance what their customers shall wear. Mankind has not yet overcome the imitative faculty which it chooses to call "fashion," nor the barbarity of ornament, while people deck themselves with metal and animal products obtained at the cost of enormous suffering.


CONDUCTED BY FRANK C. DENNETT.

| | August. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 10 | 4.40 a.m. | 7.30 p.m. | 9.23 | 15° 21′ N. |
| | 20 | 4.56 | 7.10 | 10.0 | 12° 12′ |
| | 30 | 5.12 | 6.49 | 10.37 | 8° 44′ |

| | | Rises. | Souths. | Sets. |
|---|---|---|---|---|
| *Moon* | 10 | 6.9 a.m. | 1.13 p.m. | 7.56 p.m. |
| | 20 | 6.17 p.m. | 10.16 | 1.6 a.m. |
| | 30 | 8.48 | 4.42 a.m. | 1.19 p.m. |

| | | Souths. h.m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 10 | 0.44 p.m. | 2″ 5 | 10.4 | 13° 33′ N. |
| | 20 | 1.11 | 2″ 6 | 11.9 | 6° 13′ |
| | 30 | 1.26 | 2″ 9 | 12.2 | 0° 58′ S. |
| *Venus* | 10 | 0.41 p.m. | 4″ 9 | 9 59 | 13° 49′ N. |
| | 20 | 0.49 | 5″ 0 | 10.46 | 9° 21′ |
| | 30 | 0.55 | 5″ 1 | 11.32 | 4° 28′ |
| *Mars* | 10 | 6.21 a.m. | 4″ 2 | 3.38 | 18° 2′ N. |
| | 20 | 6.6 | 4″ 4 | 4.3 | 19° 27′ |
| | 30 | 5.51 | 4″ 6 | 4.27 | 20° 36′ |
| *Jupiter* | 20 | 11.41 a.m. | 14″ 3 | 9.38 | 14° 55′ N. |
| *Saturn* | 20 | 4.49 p.m. | 7″ 6 | 14.47 | 13° 48′ S. |
| *Uranus* | 20 | 5.15 p.m. | 1″ 8 | 15.13 | 17° 41′ S. |
| *Neptune* | 20 | 7.20 a.m. | 1″ 2 | 5.17 | 21° 14′ N. |

MOON'S PHASES.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Last Qr.* | Aug. | 1 | 6.34 p.m. | *Full* | Aug. | 23 | 7.4 a.m |
| *New* | „ | 9 | 5.2 a.m. | *Last Qr.* | „ | 31 | 10.55 a.m |
| *1st Qr.* | „ | 15 | 9.2 p.m. | | | | |

THE Sun still shows small disturbances only upon his disc.

METEORS should be specially looked for August 3, 5, 7–13, 15, 19–22, notably on those nights during the earlier half of the month.

METEOR.—Mr. Geo. H. Knowles writes from South Hornsey: "I observed a meteor on the 5th July, at 12 o'clock, p.m., travelling from south to south-east, at splendid brilliance."

DURING August the whole of the planets are poorly placed for useful observation. Mars rises about eleven on the 1st, and before ten at the end of the month, but still displays a very small angular diameter.

STAR ECLIPSED BY A COMET.—Since our last number was in the press we have found in the *Astronomische Nachrichten* that Signor Cacciatore, of the Palermo Observatory, on the evening of August 7th, 1864, saw an 8-magnitude star eclipsed by the nucleus of Comet I. of that year.

LUNAR ECLIPSE.—On August 23rd, the Moon comes into contact with the penumbra, at 4.8 a.m., the first contact with the shadow being at 5.24. As the Moon sets at 4.58 at Greenwich, all that can possibly be seen there will be the faint shading on the disc due to the penumbra. In the western portions of Ireland, however, the contact with the shadow will occur just before the moon sets. The eclipse is a partial one, its magnitude, taking the Moon's diameter to equal 1, will be represented as = 0 73.

OCCULTATION OF JUPITER, JUNE 14TH.—Very many observers saw the disappearance of the planet, also of his four satellites, behind the dark portion of the moon which was readily visible by the earth-shine, or, to use scientific language, *lumière cendrée.* Speaking generally, the observers seem to have witnessed no phenomena that could have been due to the refraction of the very slight lunar atmosphere, the belts being visible across the planet right up to the moon's limb.

VARIABLE STARS.—Some time since the Rev. T. E. Espin prepared, and very kindly forwarded to the writer, a list of objects of this class, mostly visible to the naked eye. This list is proving most useful in the preparation of our monthly table. Those in good position for August are given below.

| | R.A. h.m. | N. Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| 24 R.Cephei* | 20.23 | 88° 44′ | 5 | 11 | |
| Pxxi, 285 „ | 21.39 | 58° 11′ | 4 | 6·5 | |
| δ „ | 22.24 | 57° 45′ | 3·7 | 4·9 | 5d.8h.47m.39s. |
| η Cygni | 19.52 | 34° 47′ | 4·5 | 6·7 | |
| 63 „ † | 21.1 | 47° 2′ | 5 | 6 | |

* Sir W. Herschel's famous "Garnet Sidus."
† Variable also in colour, yellowish to orange-red.

BROOKS' COMET, discovered 1889, returns to its perihelion about the end of August, or a little later. As we write, it is travelling through the southern part of Aquarius. It was observed by M. Javelle, at Nice, with the 30-inch refractor, on June 20th, in R.A. 22h. 25m. 30s., S. Dec. 18° 33′ 59″, since which it has slowly moved eastward. Mr. A. C. D. Crommelin writes from the Royal Observatory, Greenwich, that on August 1st the comet should be in R.A. 22h. 37m. 59s., S. Dec. 18° 32′. "The brightness on August 1st will be double that on June 20th," when discovered at Nice.

DRIVING-CLOCK FOR EQUATORIAL TELESCOPES.—Messrs. Horne and Thornthwaite have put on the market a neat and at the same time efficient piece of apparatus for driving instruments of moderate aperture. A tangent screw is acted on by a weight, whilst clockwork controls its speed of revolution. Mr. Overstall, the inventor, is to be congratulated in introducing so useful an attachment. Clockwork so much simplifies the employment of the micrometer and the spectroscope; indeed, much work of this class is absolutely out of the question without it.

THE total eclipse of the Sun on August 9th is visible along a line stretching from northern Norway, across Nova Zembla, Siberia, Manchuria, to northern Japan. At Greenwich the eclipse is totally invisible, but in Scotland, at sunrise, the end of the eclipse may be observed. Extensive preparations are, of course, being made to observe the phenomenon at various points along the line of totality. Many of our English observers will be stationed at Vadso, in Norway, situate about E. long. 30°, N. lat. 70° 10′. Endeavours will be made both to draw and to photograph the corona. Likewise the spectrum will be observed, all being well, directly, and also photographed, both with and without a slit. A little time since, Mr. D. E. Packer, of Birmingham, was telling us about photographs of the corona taken with a pin-hole camera on a photographic plate covered with lead-foil, and without an eclipse. It is to be hoped that on August 9th he will be enabled to take some of these photographs to compare with those taken by the eclipse observers.

# SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

Annali del Museo Civico di Storia Naturale di Genova. (Genoa: 1895. Volume xxxiv.) A handsome portrait of the late Signor Andrea Podestà forms the frontispiece to the first cited volume. The voyage of Leonardo Fea, in Burma continues to bear fruit in the present volumes, in the shape of many important memoirs. Mr. C. J. Gahan, of the British Museum, contributes a list of the Longicorn Coleoptera, with descriptions of new genera and species, occupying 104 pages, with 1 plate (English text). Dr. R. Blanchard treats of the Hirudinae (leeches), describing two new species; M. A. L. Montandon, the Hemiptera, with several new genera and species; Dr. A. Schobaut describes a new species of the coleopterous genus *Rhipidius;* Herr J. Faust deals with the Curculionidae (weevils), in a German memoir of 218 pages; M. A. de Bormans on the Dermatoptera (earwigs) in French; M. J. Vachal describes new species of the hymenopterous genera, *Halictus*, *Prosopis*, *Allodape* and *Nomioides* in French, with a discussion on their taxonomic order; Signor Carlo Emery enumerates the Ants, many of which are new, and Herr G. Budde-Lund, the terrestrial Isopoda; the Rev. H. S. Graham describes the Coccinellidae in English, and M. A. Grouvelle two new beetles of the genus *Rhysodes* in French; Mr. R. J. Pocock, of the British Museum, reports on the Myriopoda (English text). The voyage of Signor Lamberto Loria to the Papuan Region has also resulted in many noteworthy contributions to science. Of these the Aradidae, a section of Hemiptera are discussed in Latin by Herr E. Bergroth; the Birds, five new species, by Signor T. Salvadori; the the Freshwater Fishes by Signor A. Perugia; the Brentidae (beetles) by Signor A. Senna. The results of Dr. Elio Modigliani's travels in Sumatra are also given: Signor L. Camerano treats of two species of Gordius (worms); M. E. Candège, of the Elateridae (clickbeetles), in French; Herr L. von Graff on the land-planarians, in German; M. Charles Kerremans on the Buprestidae (beetles), in French; M. J. Richard on the Entomostraca, in French. The collections made by the same traveller in the Mentawei Islands are treated of by specialists: Mr. G. A. Boulenger, of the British Museum, deals with the Reptiles and Batrachians, in English; Signor T. Salvadori, the Birds from Sipora; and Mr. Oldfield Thomas, the Mammals, also from Sipora. Other memoirs, the results of various travellers' collections, are "On some Mammals of Engano Island, West Sumatra," by Mr. Oldfield Thomas, in English; "On some new species of the genus *Coptosoma*, from Australia and New Guinea, belonging to the collection of the Civic Museum of Genoa," by M. A. L. Montandon, in French; "Contributions to our knowledge of the Diplopoda of Liguria," by Mr. R. J. Pocock; "Diagnoses of new species of Cave Miriapoda," by Signor F. Silvestri; "New Species of Anthicidae (beetles)," by M. Maurice Pic; "Chilopoda and Diplopoda from New Guinea," by Signor F. Silvestri; "Cicindelae from Sumatra," by M. W. Horn, in French; "Chilopoda and Diplopoda, collected by Captain G. Bove and Professor L. Balzan in South America," by Signor F. Silvestri.

Bulletin de la Société Zoologique de France. (Paris, April-June, 1896.) MM. Jules de Guerne and R. Horst discuss a gigantic worm from the Basses-Pyrénées. M. Louis Petit, in an interesting article on "The Destruction of Birds," states that at the present time the barbarous fashion of decorating ladies' hats with birds is fortunately on the decline. During the last two years, he informs us, only wings and egrettes are used (quite as bad); but as soon as the fashion revives the provincial purveyors will recommence their odious traffic, and thousands of these useful and beautiful birds will be sacrificed to the vanity of the weaker sex. Swallows and swifts form a large contingent of this wholesale massacre. After close time in France, the author informs us, no quail are allowed to be shot or offered for sale. Quite right; but of what use is this when their destruction is authorized on the other side of the Mediterranean? One thing is certain, as soon as the destruction of birds is stopped in France, the caterers for this degrading traffic will start for Algeria, as many have already done, and Tunisia, where they can kill and destroy without let or hindrance. One of the author's correspondents assures him that during March every year quail are killed by thousands in the environs of Biskra, Onargla, and other places. The author advocates the formation of a committee with powers to proceed against the offenders. It might be suggested that a more efficacious mode of procedure would be to make the traffic in birds killed for personal adornment illegal, or, better still, to make the wearing of them a penal offence; but it is to be feared our legislators are not yet prepared for such drastic measures. Meanwhile, it is gratifying to note this well-timed protest against a barbarous custom on the other side of the Channel, whence the goddess of fashion sends her mandates to all parts of the civilized (?) world. M. Armand Janet relates an interesting instance of the adoption by a cat of a young guinea-pig. A friend made him a present, for his son, of two guinea-pigs, one thirty-four days old, the other ninteen days, the latter not having been weaned. They were placed with a cat who had two kittens. Knowing that cats sometimes eat guinea-pigs, they were carefully watched. The cat was somewhat surprised at this intrusion, and smelled the new-comers all over, but finally allowed them to lie close to her on the straw. Shortly after they were, however, removed. Directly, the cat came crying to the door, and upon its being opened, she entered at once and took up the younger of the two guinea-pigs and carried it to the box where her own offspring were installed. She then tried to carry the older guinea-pig, but as this resisted and squealed, it was taken up by the owner of the cat and placed with the other. The cat was now quite happy, and impartially licked the guinea-pigs as well as her kittens. They remained in the box with cat and kittens during about a week, and it was observed that the younger guinea-pig received a fair share of the suckling. After a time they were removed to a separate box, to which, however, the cat still had access, and she still continued to show her affection to her adopted children, coming at once whenever they cried, and licking and cleaning them just like her own offspring.

## IN MEMORIAM

Sir Joseph Prestwich, D.C.L., F.R.S., whose death we briefly recorded in our last number, was born in 1812, at Clapham, in Surrey. His early education was conducted in London, Paris, and at Dr. Valpy's Grammar School at Reading, whence he passed to University College, London. In consequence of some lectures by Prof. Turner, his attention was drawn to the study of geology, to which he devoted much of his leisure after entering upon the occupation of a wine-merchant in the City of London. In that business he was successfully engaged until reaching his sixtieth year. Whilst travelling for the firm in his earlier days, he had many opportunities of observing the geology of Britain and for gathering fossils. When twenty-four years old, Dr. Prestwich wrote for the Geological Society of London an admirable paper upon the geology of the Coalbrook Dale region of Shropshire, which brought his name favourably before the scientific public of the period. This was followed by a study, on the suggestion of Sir Roderick Murchison, of the Ichthyolites of Banffshire. His geological interests, however, soon centred about London in an examination of the Eocene formations of the London Basin. This led to his defining and naming the Woolwich and Reading Beds, as well as the Thanet Sands. In this investigation he gave much attention to the organic remains in the London clay. He spent on this particular study most of his leisure for quite twenty years. One subject in connection with which Sir Joseph will long be remembered was the successful examination in valley gravels for evidence of early man, by which he was largely instrumental in showing that man and the mammoth were co-existant with various other Pleistocene animals. This led to endless discussion on the antiquity of man, which, in some minds still remains a very unsettled speculation. In 1853, Sir Joseph was elected a Fellow of the Royal Society, of which he became a Vice-President in 1870, when he was also appointed President of the Geological Society. Having retired from the wine trade in 1872, he was offered the chair of Geology at Oxford two years later, on the death of Professor Phillips, from which professorship Prestwich retired in 1888. As a writer on geological subjects he was as well-known as voluminous. Sir Joseph Prestwich was selected by Her Majesty's advisers for honour as a representative of science early in this year, though his delicate state of health forbade his acceptance of knighthood in person from the Queen. We understand, however, that he had long been Sir Joseph in his own right, through the inheritance of a baronetcy, though he never took steps to assume the title. The funeral took place at Shoreham churchyard, in North Kent, near his late residence, many persons of consequence in the geological world of science attending. The service was conducted by the Rev. Professor Bonney, F.R.S., assisted by the Rev. R. A. Bullen, the Vicar, who is also interested in natural science.

## NOTES & QUERIES

Plusia moneta at Leatherhead, Surrey.—During the autumn and spring of 1894-5 I stocked our garden with a good number of plants of monkshood, in the hope of attracting this rare moth, choosing three of the usual garden varieties of the plant. The season of 1895 did not produce any, but in the present year a successful result has occurred, for we took one specimen on the 7th, two on the 8th and one on the 9th of July, on which evening another was lost. All were taken hovering at dusk over the flowers of the monkshood; in each case the variety of flowers being the ordinary white one with blue edges. I should be glad to know if any of your readers have observed *Plusia moneta* over any other variety of the plant.—*C. A. Briggs*, 55, *Lincoln's Inn Fields; July 16th*, 1896.

Rooks swallowing Fir-Cones.—While much interested in the Rev. H. W. Lett's observations (*ante* p. 52) of the rooks swallowing Scotch fir-cones whole, I can vouch for it that they by no means limit their attention to the smaller cones, for it is a common sight in some parts of Ireland to see rooks carrying full-sized pine-cones into the fields, and much curiosity has been expressed as to what they do with them. Thompson, in his "Natural History of Ireland," has the following remarks on the subject: "What rooks do with the cones of the Scotch fir, subsequent to carrying them off, has not been ascertained. It would seem to me that unless the scales be so widely open that the seed is ready to drop out they can hardly reach it, and even then a portion only would be accessible. The scales themselves could only, I conceive, be detached when partially decomposed." Thompson's attention had been drawn to the subject apparently by his correspondent, Mr. Joseph Poole, of Wexford, who had observed the rooks at work "carrying off cones of Scotch fir and dissecting them on the ground." I had myself very frequently seen rooks in the act of carrying cones into the field and mangling them with their bills. On picking up these cones, of which I have examined a large number, chiefly in September and October, I have noticed (1) that the cones, though not small, were invariably green, and their scales, of course, still rigidly compact, and (2) that much of the green surface had been hacked away by the rook, but that this had been done in an awkward fashion, so that although it seemed difficult to doubt without further evidence that the seed was the real object of search, it was quite clear that in a great number of instances the seed had not been reached. I mentioned this peculiarity in the "Irish Naturalist" for October, 1894, page 210, and soon afterwards a very observant gentleman told me that his experience only partly agreed with mine, inasmuch as the rooks which he had watched carrying cones into the fields made no attempt to eat, but *buried* them. From all these circumstances it is clear enough that the rooks' conduct towards the cones of *Pinus sylvestris* varies not a little according to the occasion; but I think Mr. Lett's recent observation

establishes this much, that the seed is not specially the bird's object, but that the substance of the cone itself, when young and green, is found by the rook a good vegetable esculent. Probably as long as small cones are plentiful the rook picks them by preference, and swallows them whole, as Mr. Lett describes; when these are scarce, however, it carries off the larger, of which it eats only the outermost part, and if not particularly hungry it buries them, perhaps with a view to promoting decomposition, though on that point I refrain from committing myself to a decided opinion. It is curious to find how much notice this habit of the rook has attracted in Ireland, and how little, apparently, elsewhere. Can we have a species of rook, *Corvus conilagus*, all to ourselves? St. Kilda had a wren, whose fate we deplore grievously; but the British ornithologist, if moderate in his desires, will not be begrudged a few specimens of the Irish rook for examination.—*C. B. Moffat*, 36, *Hardwick Street, Dublin; July 7th*, 1896.

Oyster Killing Mice.—A quaint mouse-trap, and a very effective one, has lately been discovered at the great fishing port of Grimsby. A resident of that town placed a living oyster on his pantry floor, and during the night it appears to have opened. Evidently tempted by the smell of fish, three mice placed their heads inside the open shell, whereupon the oyster quietly and rapidly closed; the result

being as shown in the accompanying illustration. Oysters have been previously known to trap odd mice in a similar fashion, but the capture of three simultaneously is a fact which doubtless has never been surpassed by an oyster.—*William H. Marris*, 118, *Freeman Street, Grimsby*.

Scalariforme Shells.—In the month of June, 1895, I found a living scalariforme monstrosity of *Helix nemoralis* on the Downs, east of Brighton in Sussex. It is a single rather broad-banded (00300) var. *libellula*. Although the spiral is well developed, the specimen did not commence this peculiar growth until about the completion of the second whorl of the shell, the remaining four whorls somewhat resembling the figure of a specimen in the Liverpool Musuem on page 64 of volume i. of Science-Gossip (1894). On the 4th of July, 1896, I had the good fortune to find a scalariforme example of *Helix pomatia* in North Kent. Unfortunately it was not a living specimen and had been slightly injured on the second whorl and at the lip; still, after being cleaned, it makes a very handsome and interesting specimen. It is about one third larger than the scalariforme, *H. pomatia*, figured from the Liverpool Museum on the same page above referred to. The whorls in my specimen are much the same as these drawn, excepting the last, which is stouter. As the shell is heavy and strong, the animal apparently died from old age. These monstrosities are evidently very rare in a state of nature, for these are the only two I have met with among the hundreds of thousands of banded Helix shells examined by me during many years past.—*John T. Carrington*.

Abnormal Asparagus.—I am sending you a sketch of a curious growth of asparagus found in this garden. The stem is about three feet in length, bent into the shape shown in the sketch. It is one and three-quarter inches in breadth and barely a quarter of an inch in thickness, but as hard and stiff as a piece of board. I thought it might interest some of the readers of Science-Gossip.—*C. M. Gibbings, Sunnyside, Mears Ashby, Northampton; July 10th*, 1896. [The sketch indicates a fasciated example, which has been permitted to grow to maturity, giving it a very odd appearance. Fasciation is frequent in cultivated asparagus. Ed.]

Roosting of Helix pomatia.—During the recent intensely hot weather, I was surprised to find at Eynsford, Kent, some specimens of *Helix pomatia* roosting on twigs in an old ragged hedge, where they are not uncommon. The shells were very conspicuously placed, sometimes as much as four feet from the ground. Possibly they were tempted into this position during one of the few showers of rain which fell some weeks previously to my finding them, and when the sun shone shortly afterwards, they remained where they were. This high roosting habit is common with *H. hortensis* and to a lesser degree also with *H. nemoralis;* but I do not remember having heard of it occurring among *H. pomatia.—John T. Carrington; July 15th* 1896.

Tales of my Tusks.—Now that every loyal Briton is talking about H.R.H. Princess Maud of Wales and her marriage, it will interest some of our readers to know that she has a "collection." It consists, as might be supposed from the individuality of character of the princess, of anything but a ladylike hobby. Tusks—elephantine, ursine, porcine, rhinocerine and many others—have long been collected by Princess Maud. Each has its history, for they are chiefly trophies from the quarry of the mighty hunters of her family, taken in many distant lands. These stories, all true ones, are entered, in Her Royal Highness's characteristic handwriting, in several MS. books, bearing the title "Tales of my Tusks." When Princess Charles gets her Science-Gossip for this month, she will see by page 75 that animals other than lions, snakes, sharks and alligators are bearers of tusks.

Ferocity of Dragon-fly Larvæ. — To creatures larger than themselves the Libelluline larvæ must prove disagreeable antagonists. Having occasion to lift by a pair of forceps an *L. 4-maculata* larva, it immediately arched the nippers of the mask over its back until the top of the head was completely hidden while attempting to seize the steel in their powerful grasp, and actually producing a slight snapping noise in its rage. Endeavouring to test the sensation of contact with these caudal points, one of my fingers, carefully approached towards them, received a very decided prick in the rebound of the creature's tail to its normal position, much more so than otherwise I should have believed possible. Larvæ-nymphs, dead or alive, of all groups, will always be acceptable to me.—*W. H. Nunney*, 25, *Tavistock Place, Bloomsbury, W.C.*

# TRANSACTIONS

South London Entomological and Natural History Society.—May 28th, Mr. C. G. Barrett, F.E.S., Vice-President in the chair. Mr. A. H. Bartlett, M.A., 34, Vanbrugh Park, Blackheath, was elected a member. Mr. McArthur exhibited a bred series of *Hypsipetes ruberata* and *H. trifasciata* from Hoy, which, as imagines, were inseparable; the latter species was reared on heath. From the same locality, *Eupithecia venosata*, *E. pulchellata*, and *Melanippe fluctuata*, var. *neapolisata*. Mr. Warne, the curious inverted wine-glass-shaped cocoon of a spider, said to be probably *Agelena brunnea*, found suspended among heather in the New Forest. Mr. Sauzé, a small specimen of *Sinodendron cylindricum*, taken by Mr. Adkin at Worthing, and *Ledra aurita*, one of the remarkable Membracidæ, *Silpha quadrimaculata*, *Hippobosca equina*, and *Hoplia philenthus*, all from the New Forest. Mr. West, on behalf of Mr. McArthur, specimens of *Chrysomela arvensis*, and *C. sanguinea* from Hoy, with *C. distinguenda* from the South of England, for comparison with the local northern *C. sanguinea*. Mr. Edwards, a twig of fir containing the nodule and larva of *Tortrix piceana*, from Brockenhurst. Mr. Filer, larvæ of *Pœcilocampa populi*, and *Trichiura cratægi* from Epping Forest. Mr. Clarke, microphotographs of the bacillus of lockjaw and of typhoid fever × 1000, the latter showing the flagellæ very plainly. Mr. Montgomery had had a large brood of larvæ of *Saturnia carpini*, of which a very considerable number were attached by ichneumons. Mr. Adkin remarked on the abundance of parasites he had seen in his garden and elsewhere. In reporting on the Field Meeting at Brockenhurst, Mr. Edwards said that imagines were more plentiful than last year, and that larva beating was very successful. The weather was fine, and some twelve members were in attendance during the three days. *Macroglossa fuciformis* and *M. bombyliformis* were both captured. Larvæ of *Limenitis sybilla*, *Catocala promissa*, *C. sponsa*, *Tæniocampa miniosa*, *Spilosoma mendica*, *Zephyrus quercus*, and *Z. betulæ* were among the species found. —June 11th; Mr. C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. Monington, 141, Broomswood Road, Wandsworth Common, was elected a member. Mr. Lucas exhibited specimens of *Ichnura elegans*, *Pyrrhosoma minium* and a series of *Platetrum depressum*, including a male which had not developed the blue colour characteristic of the sex. They were taken by Mr. Turner at Folkestone on May 17th. Mr. West, of Streatham, a series of *Macroglossa fuciformis*, taken at Brockenhurst during the Whitsuntide field-meeting. Mr. Barrett, specimens of the new Noctua (*Leucania flavicolor*), recently described by him, and which were captured on the coast of Essex by Mr. G. F. Matthew. It was apparently allied to *L. pallens*, from which it differed not only in colour and markings, but also somewhat in the shape of the wings. It was thought that if this exhibit were again brought up, after members had examined their own series, a discussion could take place. Mr. Barrett also exhibited several beautiful, bright, uniform red forms of *L. pallens* from the same locality; a very large and dark specimen of *Mamestra abjecta* and a beautiful var. of the same, having all the markings clear and distinct upon a light ground; a var. *remissa* of *Apaea gemina* and a specimen of *Hadena genistæ*, to both of which the var. of *M. abjecta* was comparable in many respects. Mr. N. E. Warne, a series of *Procris statices* from Keswick, and a few specimens of *Emmelesia adæquata* (*blandiata*), one of which had the central band almost complete. Mr. Tunaley a specimen of *Ermpis tessalata*, having in its grasp a *Tipula* which it had captured. The middle legs of the Ermpis clutched the shoulders of the wings of the *Tipula*, the hind legs were bent under the wings and body, while the fore-legs of the Ermpis were free to grasp any support. The *Tipula* was thus held in a vice, and frequently lost its legs in the struggle. The Ermpis repeatedly pierced the thorax of the *Tipula* with its lancet, but was not always successful, owing to the struggles. This could easily be observed if the insects were placed together in a small glass-topped box. He also exhibited an asymmetrical form of *Coremia designata* from Ranmore, Surrey, having the band of the right primary narrower than usual but filled in completely with the dark colour. The inner margin of the band was straighter than in normal specimens. Mr. Mansbridge, a specimen of *Syrichthus malvæ* having a notch at the apex of all the wings in which the cilia were present, but shorter than usual. A discussion ensued, some members considering it to be caused by an injury to the pupa, and others thought that the cilia were shorter than usual and that the proximity of the white patch somewhat accentuated the appearance of the notch. Mr. Edwards, a specimen of the rare *Papilo danisepa* from the Khasi Hills, and a short series of *Leptocircus curius*. He then read a few notes on the very aberrant genus of the Papilioninæ, *Leptocircus*. After enumerating the species and stating the characters by which it differed from the other genera of the family, he described its distribution and quoted the opinions of various collectors that the species were mimics of species of Neuroptera both in their appearance and habits. It was noted by various members that the defoliation of the oaks was this year not so much due to the attacks of *Tortrix viridana*, but to the larvæ of the different species of *Hybernia* It was also remarked that oaks, having bright green foliage, had comparatively escaped attack, but that trees which had leaves of a dark brownish green were mostly completely stripped. —June 25th; Mr. R. South, F.E.S., President, in the chair. Mr. West, of Streatham, exhibited a bred series of *Hypsipetes ruberata* containing uniform and banded specimens, and a specimen of *Trochilium crabroniformis*, bred from an osier-stem cut at Streatham in expectation of obtaining *Sesia formicæformis*. Mr. R. Adkin, a bred series of *Eupithecia venosata* from Hoy, with series from Shetland, Forres and Isle of Man for comparison, and noted that the Orkney ones were of a browner shade, while the Isle of Man specimens were like South of England netted forms; also full-fed larvæ of *Calocampa vetusta*, reared on dock from Inverness-shire ova. Mr. Barrett, a series of the rare *Osmylus chrysops* from Haslemere. Mr. South, types of the variation obtained from a brood of *Spilosoma menthastri* from Aberdeen. Several were smoky, one had dark fringes, in another the edges of all the black markings had run in appearance. Mr. MacArthur, the five most remarkable

forms of *Abraxas grossulariata* bred this year from some 3,000 larvæ. In one, the black external to the yellow band was almost entirely suffused; another was slightly smoky, and the spots had the appearance of having run; a third had the fore-wings almost entirely black, with the outer half of the hind wings wholly black; another had the hind wings with a narrow black border, from the middle of which a wide streak ran into the centre of the wing. The smoky form was remarked as being very rare. Mr. Manger, the huge malodorous flower of the exotic orchid, *Stanhopea tigrina*. Mr. Dennis, a series of *Cœdonympha typhon* from North Lancashire, taken early in June. The specimens had very pure white markings underneath, referable to var. *rothliebii*. Also he exhibited several very brilliant *Cyaniris argiolus* from Horsley, of a shade approaching that of *Polyommatus bellargus*. *Limenitis sybilla* was reported to be flying in the New Forest early in June. Mr. Turner made a few remarks on the locality visited by the Society under the guidance of Rev. E. Tarbat on June 20th. —*Hy. J. Turner, Hon. Report. Secretary.*

Selborne Society (Croydon Branch).—Some twenty members of this Society met in lovely weather on the first Saturday in July for a ramble from Banstead Heath to Woodmanstowe and Coulsdon. On the first Saturday in each month the central Society has arranged to meet around Croydon. Last Saturday's walk was a little-known one, and opened up some very charming scenery. The early blossoming of wild-flowers was noticed; amongst the appearances being red bartsia, melilot, wood-sage, St. John's wort, meadow-sweet, yellow bedstraw and toad-flax. Prominent around an old lime-kiln a quantity of vipers' bugloss was met with, some specimens being five feet high. The noble ash-trees of the plantations about Woodmanstowe were especially worthy of admiration. A hope was expressed that the District Council would be alive to the necessity of protecting the public footpaths now being threatened by the Chepstead Valley Railway in the neighbourhood of Cousldon.

North London Natural History Society.—At the meeting of May 23rd—Mr. C. B. Smith, President, in the chair — the exhibits included: Mr. Bacot, specimens of *Tryphœna comes (orbona)*, bred from ova laid by two females taken at Sandown last September. The larvæ fed up during the winter on cabbage, carrots, etc., and the moths emerged during January, February, and March. As the larvæ got mixed, he was unable now to separate them into two broods, which was unfortunate, as the variation was considerable. The females were too worn to be worth keeping, but, so far as he could remember, there was nothing very remarkable about them; also *Tryphœna janthina*, bred from a female taken at Sandown. Mr. Simes, *Epipactis grandiflora* (white helleborine), *Aceras anthropophora* (green-man orchis), *Asperula odorata* (woodruff), and *Poterium sanguisorba* (salad burnet). He gave an account of his work at Whitsuntide. On May 23rd, at Epping Forest, he had seen *Polyommatus phlœas*, larvæ of *Odonestis potatoria*, ova of *Euchloë cardamines*, *Drepana binaria* (*hamula*), *D. cultraria*, *Eubolia plumbaria*, *Panagra petraria*, *Nisionades tages*, and *Syricthus malvæ*, but had noticed no fritillaries. On May 24th, at Thames Ditton, he had seen the ova of *Euchloë cardamines* on *Erysimum alliaria*, *Sisymbrium cannabina* and *Cardamine pratense*, and had also noticed *Anaitis plagiata*, *Pararge megæra*, and a dwarf specimen of *E. cardamines*. On May 25th, at Ripley, he had seen *Argynnis euphrosyne*, *Lycæna minima*, *L. bellargus*, *L. icarus*, *Euchelia jacobeæ*, *Euclidia glyphica*, and larvæ of *Cucullia verbasci*, but no *Nemeobius lucina*. Mr. Harvey, specimens of the fruit of the oak, showing variation in size and shape, and the cuckoos and other eggs. Mr. Prout gave an account of the collecting on Epping Forest. He had taken the larvæ of *Asteroscopus sphinx* off the buckthorn, and a specimen of *Dicranura furcula* on a tree-trunk about 8.30 p.m., and the larvæ of *Trichuira cratægi* were again being found commonly. Mr. Prout read a paper written by his sister on "The Oak Tree." On June 13th this Society made an excursion to Oxshott, arriving at about 10.30 a.m. On getting over the railway bridge on to Esher Common, Mr. Lovis espied a freshly-emerged specimen of *Chœrocampa porcellus* at rest on a small plant. On proceeding over the Heath several *Anarta myrtilli* were seen. A pine-wood produced *Bupalus piniaria*. Mr. C. Nicholson took a fine specimen of the local *Tortrix piceana*. Some half-dozen specimens of *Ellopia prosapiaria* were found at rest on the pine-trunks, on which also occurred *Scoparia ambigualis*, of which fifteen were counted on one tree.

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* sh-uld be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Cuckoos' eggs with those of foster parent wanted.—W. Wells Bladen, Stone, Staffordshire.

Microscope.—Swift's Histological, 5 eye-pieces, 1", $\frac{1}{8}$", $\frac{1}{12}$"-objectives, substage, condenser, etc., nearly new, worth £22; exchange for astronomical telescope to value or offer.—Letters to J. C. Webb, 32, Henslowe Road, Dulwich, S.E.

Eggs of glaucous gull, great black back, kittiwake, laughing gull, gannet, Bartram's sandpiper, roseate tern and others. Wanted, clutches with data of many of the smaller birds.—K. H. Jones, St. Bride's Rectory, Manchester.

British Birds' Eggs.—For exchange, common, kittiwake and other gulls, R. T. divers, R. N. phalarope, eiders, five species terns, guillemots (choice and common), cormorants, rock-pipits, nightjars and others; also bird-skins and well-stuffed specimens. Wanted, other British clutches of eggs.—E. G. Potter, 19, Price Street, York.

Wanted, slides (by Flatters) and trilobites; in return, shells, fossils, unmounted objects, etc. Offers wanted for 1890-1895 Science-Gossip, "Naturalist's Journal," 1894-5.—A. Sclater, Naturalist, Teignmouth.

# SUMMER AT THE NORTH POLE.

By Dr. N. Ekholm.*

WITH regard to the projected voyage of Mr. Chief Engineer Andrée, of the Swedish Patent Office, to the North Pole in a balloon, the opinion has been expressed that such an undertaking would encounter insurmountable difficulties. For instance, some persons seem to think that in the lower strata of the Polar atmosphere all winds blow towards the Pole; therefore the atmosphere would there ascend and, at a great height, flow southwards, and as the projected aerial voyage would be performed at a mean height of about 250 metres (that is, in the lower strata of the air), Andrée and his companions, of whom I shall be one, would reach the Pole, but not be able to get away. Even more curious ideas have been broached, and these have caused the writer, as a member of various Arctic expeditions, to examine into the wind temperature and cloud conditions around the Pole during summer, the results of which are presented in this paper.

## The Wind Conditions.

During the month of July a high atmospheric pressure lies over the Central Atlantic Ocean and Central Europe, whereby westerly winds mostly prevail between America and England and North Germany. A corresponding high pressure is situated over the northern part of the Pacific Ocean, accompanied by south-westerly winds in its northern part. Quite the reverse are the conditions over the highly-heated continents. Over these there lie great minima, accompanied by north-easterly wind over Siberia, which changes to north-westerly in the northern part of European Russia. In British North America the minimum is divided into several minor pressures, but still northerly winds are the prevailing. North of the central Atlantic maximum there are situated some smaller minima over Scandinavia, south of Iceland and Baffin's Bay. North of these are the regions which interest us more especially, and which are but little explored.

By the aid of the barometer and wind observations made at various Polar stations, particularly those at Fort Conger (the Greely expedition), Cape Thordsen (the Swedish expedition of 1882-83), and Franz Josef's Land (the Austrian expedition, under Pazan), we are able to form an idea of the weather conditions around the Pole—an idea which, I believe, approaches very near reality.

The meteorologists Haun and Buchan have drawn charts of the atmospheric conditions at the North Pole, and they come to the conclusion that a vast but weak barometrical maximum extends away from the Pole on all sides. But in framing these charts all the material at our disposal has not been utilised. The writer has from the same, supported by the wind observations made at Fort Conger and Spitzbergen, come to the conclusion that the great Polar maximum of Haun and Buchan shall be separated into three parts, one situated south of Spitzbergen, one over the inland ice of Greenland and one over Northern Alaska. Over the Pole itself a weak minimum most probably rests. This was evident from the weather observations made at Cape Thordsen, Spitzbergen. They show that storm-centres in July, coming from the Iceland minimum, sometimes pass to the north of Iceland west of Spitzbergen, toward the Pole, instead of as usual going in a westerly direction. Likewise minima sweep sometimes past Fort Conger Polewards.

As regards the frequence of southern winds at Spitzbergen in July, the Swedish expedition of 1882-83 observed that the wind on eighteen days of forty-six (July 1-August 15) blew between S.S.E. and S.S.W., and on ten days a corresponding movement of the clouds in the strata was observable. As thus several days are fine we may conclude that a wind favourable to the balloon voyage would prevail for about one-third of the season selected for the undertaking.

## The Course of the Balloon.

The balloon would, therefore, in all probability, follow a minimum on its straight road from West Spitzbergen across the Pole, and then be carried down towards the Siberian coast, where northerly winds prevail. It is, therefore, not improbable that the balloon would then sail westwards towards European Russia or Scandinavia. But, be it understood, that would be the case under the most favourable conditions, which are based upon average calculations, from which there are frequently great deviations.

## The Temperature.

The fluctuations of temperature are less complicated than the divisions of atmospheric pressure, which is shown by two comparative charts I have drawn that indicate the divisions of barometrical pressure and heat around the Pole. We have reason to conclude that the temperature around the Pole in July is very steady and uniform. There is a continuous day, and the sun's heat which falls upon every yard of the earth's surface is fairly

* Chief of the Royal Swedish Meteorological Office, and companion of Herr Andrée in the present attempt to make a balloon voyage to the North Pole.

equal over a wide area of the surface. Besides, there are vast masses of ice and snow which prevent the temperature from rising very much above freezing-point. From observations made we may conclude that in the month of July the temperature around the Pole is about 2° C. (35·6 F.). But through the direct action of the sun on the balloon a far more pleasant temperature should be enjoyed. This is as regards the surface of the earth. But at higher altitudes of course the temperature is lower, falling about 1° C. per 200 metres. Thus at a height of 250 metres we may expect to encounter a temperature of 1° C. (33·8 F.). Along the shores of the Arctic Ocean the temperature in July averages about 6° C. (42·8 F.); north of this isotherm there are no thunderstorms or hail, fine snow only falling. Thus there is no danger of the balloon being struck by lightning or hail. On account of the even atmospheric conditions, violent storms are comparatively rare in the Polar regions in summer, which should augur well for the success of the expedition.

### Clouds and Fogs.

When warm water and ice meet thick fogs are generated. Such is for instance the case between Norway and Spitzbergen where the Gulf Stream flows into the Polar ice, and at the North Siberian coast where the great Siberian rivers discharge their warm waters into the ice. Some have from this concluded that such fogs are general in the Polar regions, and prevent us observing the surface of the earth. This is a mistake. Fogs are rare near the Pole. At Cape Thordsen we observed fogs in July only during nine per cent. of the whole month, and in August only during four per cent. At Mosselbay (further west in Spitzbergen) there were observed in July and August (July observations are wanting) fogs during only six per cent. of the entire time, and at Fort Conger fogs were very rare. If the sky be always overcast, it would be impossible to determine the course of the balloon by astronomical observations, and although the cloudiness is greater at Spitzbergen than with us in summer, the observations from Cape Thordsen and Fort Conger agree that in July the sky is cloudless on thirty per cent. of its surface, and this more than suffices for our astronomical observations. Nor is it probable that the cloudiness increases northwards from these stations.

As regards the descent of the balloon, a map has been traced showing the northenmost limit of human habitations.

# BOTANICAL JOTTINGS.

By the Rev. Hilderic Friend.

A FEW items of sufficient interest to make them noteworthy have recently come under my observation. Having for many years been in the habit of recording any exceptional occurrence, I now find it easy to detect anything unusual, and the following facts have struck me as being somewhat out of the ordinary course of events.

### 1.—The Guelder Rose.

This interesting shrub (*Viburnum opulus*, L.) is so widely distributed, and both by its flowers and fruit is rendered so conspicuous, that everyone in the least acquainted with plants will be familiar therewith. Its flower-cymes usually have a circlet or ray of barren florets, which correspond with the white ray florets in the marguerite. When the whole flower is rendered barren by cultivation or otherwise, the flower-heads form a perfect globe, whence the name of snow-ball tree. Sir John Lubbock's note shows that its method of fertilization has been little studied. "Viburnum (the guelder rose) secretes honey," he says, "and the flowers are collected into a head as in the elder, but the outer florets have the corolla considerably enlarged at the expense of the stamens and pistil. Although, therefore, they produce neither pollen nor seeds, they are useful to the plant, by rendering the outer flowers more conspicuous, and thus attracting insects" ("British Wild Flowers," p. 109). The inference is that the flowers are "accessible to all insects," and may, therefore, be fertilized by any. No allusion is made to the peculiar odour emitted by the flowers when the dews of evening fall upon them—an odour somewhat resembling that of the horse-daisy (*Chrysanthemum leucanthemum*, L.) and some other flowers, and partaking strongly of the character of urate of ammonia. I was first struck by this when walking along a Sussex lane one evening some years ago. But my present object is to call attention to a peculiarity which has now been more than one season in succession under inspection. This peculiarity will be best understood by comparing the two photographs which I have taken—the one to represent the guelder rose in its normal attire, the other in what seems to be a very unusual form.

About five miles from Cockermouth, in a northerly direction, is the little hamlet of Sunderland. It is in the parish of Isel, and chiefly belongs to Sir Wilfred Lawson, M.P. I was walking from Isel to Sunderland recently, just when the viburnum was in its prime, and eagerly

looked for the two forms of flower here represented. I was curious to learn whether the tree which bore fertile flowers only had done so on former occasions by a mere freak, or whether it was a persistent habit. I soon found that the habit was persistent. One solitary shrub by the roadside, on

NORMAL GUELDER ROSE (*Viburnum opulus*).

the left hand a few hundred yards before entering the village, is rendered peculiar by the utter absence from its cymes of all the large white florets which make the other plants so conspicuous. Not only are the flowers wanting in barren forms, but the fertile ones are much more crowded and compact (as will be seen by the illustrations), so that if it was not for the foliage one might easily imagine, at first sight, that the two shrubs were totally unrelated. This lack of ray florets for advertising purposes, however, does not result in barrenness, for in the autumn the one tree is just as heavily laden with fruit as the other. The question then arises: which is the typical form? That the fact I have stated has an important bearing on evolution is clear; but it would be interesting to know whether in the unusual form we have a case of reversion to type, or in what other way the peculiarity may be accounted for. I shall not myself venture on a suggestion. In such cases it is, in my opinion, better to collect a sufficient body of evidence first, and I give mine for what it is worth.

### 2.—THE SMOOTH TOWER CRESS.

On June 6th, 1895, when I was at Isel, my eye was arrested by the presence on a hedgebank of a plant which I had never seen growing wild in the district before. Having often found it among aliens at Silloth and elsewhere, I was perfectly familiar with its form, and instantly recognized it as a choice record. On reaching home, I looked up its history in Baker's "Flora of the Lake District." It reads as follows. "*Turritis glabra*, L. (long-podded or smooth tower mustard). Native, English type, Range 1. Dry banks, very rare. Cumberland—Stainburn, near Workington (Mr. Tweddle). Westmorland—in the red sandstone tract at Clibburn, near Penrith (Lawson)."

I sent on the specimen to Mr. W. Hodgson, A.L.S., of Workington, who has a revised Flora of the district ready for the press, and received a reply to the effect that this was an entirely new locality, and, curiously enough, the only locality in which the plant is at present found, it having become extinct elsewhere.* There were at least half a dozen plants in seed last year, and I fully purposed this year to visit the spot during the flowering season, in order to obtain herbarium specimens for correspondents. Owing to my being at the time in Ireland, I was unable to do this, and when I visited the spot on June 7th (just a year after making the discovery) I found that the plant was again in fruit. There were at least a score of the most vigorous specimens. Some were not less than four feet in height, while the weakest were a yard from root to tip. Each plant was crowded with seed-pods, and if the herbage should not be cut down within a fortnight of my visit, the seeds

ABNORMAL GUELDER ROSE.

would be ripe and become dispersed ready for next year's growth.

And this leads me to the last point on which I can dwell in this article, namely—

### 3.—THE DISTRIBUTION OF PLANTS.

The subject of phyto-geography is one of intense interest and value. Everyone who can give well-ascertained facts and careful observations on the subject should do so. During my recent visit to Ireland, I made notes of several facts which struck me; but nothing created so great an

* On July 15th I received a letter from the Rev. Basil W. Lovejoy, enclosing a specimen of the plant found by him about half-a-mile from Edenhall Vicarage, on the Great Salkeld Road. As it is in all probability indigenous in this locality, we now have the tower cress from two Cumberland habitats.

impression on my mind as the remarkable predominance of certain plants within given areas along the coast between Barrow and Whitehaven witnessed on my return home. The rapid transportation of the observer from point to point by means of the locomotive enables him to observe the prevailing types, though it does not allow his mind to be diverted by the minute details. While there are hundreds of plants which are of universal distribution, there are certain special flowers which only predominate within a given range, but here they rule as kings. Thus I noticed that from Barrow to Millom the horse-daisy was dominant. The sides of the line, especially seaward from Seascale to Sellafield, were perfectly red with countless myriads of blossoms of the blood-geranium (*Geranium sanguineum*); from Sellafield northward, patches of the burnet-rose in full flower made a lovely and delicate carpet, then a veritable "field of the cloth of gold" was spread over with *Lotus* blossoms, and finally around Nethertown the great mullein (*V. thapsus*) was in the ascendant. Thus the geranium, burnet-rose and mullein were, within certain bounds, the ruling plants, but out of those bounds not a solitary specimen could be seen. At Skinburness, on the Solway, the burnet-rose and geranium grow side by side. Elsewhere, I have found the tall mignonette or woad predominant. These facts are very suggestive, and I should myself be delighted if other observers would favour us with a record of the more striking phenomena of plant distribution which have come, or yet may come, under their purview.

*Cockermouth, June 11th, 1896*

## ARMATURE OF HELICOID LANDSHELLS;

### And a New Species of Corilla.

By G. K. Gude, F.Z.S.

THAT Mollusca have numerous enemies is a fact well known to naturalists, for not only do they serve as food for many mammals, birds and reptiles, but they are preyed upon by some insects, and even by other mollusca. Naked slugs are especially exposed to the attacks of birds, slow-worms and snail-slugs (*Testacella*); and, in foreign countries, of carnivorous snails, such as *Glandina* and others. Shell-bearing Mollusca likewise are devoured by birds and mammals; they have besides many insect enemies, particularly under tropical climates, and we shall, therefore, not be surprised to find that in several instances these creatures have come to be provided with special means of protection. This has been attained in various ways, indirectly by protective resemblance between the forms or colours of the shells and their immediate surroundings; or, directly, by special structures, such as teeth, plates, or constrictions, serving as buttresses or barricades behind which the animal can withdraw. It is probable, however, that these structures may at the same time help to strengthen and support the outer wall of the shell, and in this manner safeguard the mollusc against injuries, accidental or otherwise.

In the following notes I propose to consider the several special structures or forms of armature, just indicated, as they are found in many of the genera of Helicidae, which have come under my notice. It will, of course, be understood that the operculum, which is so generally present in marine mollusca, and in the land and freshwater shells taxonomically associated with them, and the clausilium or elastic door, which characterizes and gives its name to the well-known genus of land-shells *Clausilia*, are also means of protection; but they do not form an integral part of the shell, and I do not propose to consider them here. A point to be noticed with regard to the armatures under consideration is that they are not the exclusive property of any particular genus, or wider group, but occur in various genera or groups, often of distant affinity.

#### I. Corilla.

The Helicoid genus *Corilla*, with which we are concerned in the first place, is an interesting group of landshells inhabiting the jungles of Ceylon, with a single outlying species in the southern point of the Indian Peninsula. The armature, which sometimes exhibits considerable complication, consists generally of a variable number of revolving plates or folds on the inner side of the shell-wall. It may be mentioned as a curious fact that a single species, namely *Corilla charpentieri* (Ceylon), is devoid of armature (fig. 1).

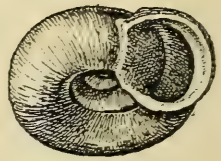


Fig. 1.—*Corilla charpentieri.*

I was favoured not long ago by Mrs. R. S. Fry, of Singapore, with some shells collected by her during a stay of several months in Ceylon; amongst these were eight specimens of a shell which, at first, I was inclined to refer to *Corilla odontophora*, of Benson, but, after some research and careful comparison with allied forms, it became evident that I had to deal with a new form. It is probable, however, that it already exists in collections, as Mr. Hugh Fulton sent me a specimen labelled

*Corilla humberti*, and Mr. John Ponsonby also possesses specimens of a similar form under the same name ; but on submitting one of my specimens to the describer of that species, Dr. A. Brot, of Geneva, he informed me at once that it was not *Corilla humberti*, but rather, he thought, a variety of *Corilla erronea*, of Albers. Dr. Brot obligingly forwarded one of the only two specimens of *Corilla humberti* known to exist in collections, so that, thanks to his kindness, I am enabled to give a figure of it for comparison with its allies.

There appears to be a certain amount of confusion with regard to the limits of some species, as well as to the position and number of teeth or plates in some of the Cingalese members of the genus, and it is hoped that the present notes may help to elucidate some of the doubtful points. The new shell is certainly distinct from all the published species of the group, and I have

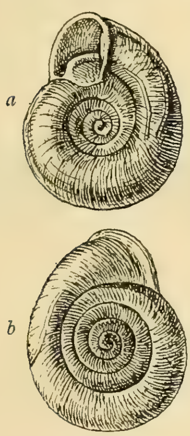


Fig. 2.—*Corilla fryae*. Fig. 3.—*Corilla erronea*.

much pleasure in associating with it the name of the lady to whose kindness I am indebted for this valuable addition to my collection.*

* *Corilla fryae*, n. sp.—Testa late umbilicata, ovato-rotundata, discoidea, solidula, rufo-castanea, planulata, oblique costulata, subtus valde concava, striata, pernitida; spira plana, sutura vix impressa. Anfr. 5 vix convexiusculi, inter suturam et peripheriam valde angulati, ultimus subtus ornatur striis spiralibus quae secundum latus lineis vel rugis impressis obliquis decussantur; antice convexior, valde dilatatus, profunde descendens. Apertura obliqua, obtuse subcordata, lamellis 3 parietales (media elongata, validaque, laterales minores, profundaeque), 4 palatales flexuosae, longulae, perlucentes, 3 ab apertura visibiles. Peristoma ex albido purpurescens vel rufo-castaneus, callosum valde reflexum, margo superior sub-dentate crassior, inferior dente valido atquae quadrato armatur.—Diam. maj. 26, min. 20, alt. 8 mm. Hab.—Albion Estate, Lindula District, Ceylon.

*Corilla fryae* differs from *Corilla erronea* (compare figs. 3*a* and 3*b*) in being more rounded in outline, larger, darker in colour and more shining beneath, the ribs are more regular and less coarse ; the whorls are less convex, almost flattened and distinctly angulated, almost keeled, midway between the suture and the periphery, while the suture is less impressed ; the last whorl is more constricted, and suddenly widens towards the aperture, becoming again constricted behind the peristome, and it is more deeply deflected in front ; the mouth is much less oblique, the palatal folds are longer and more flexuous, and the tooth on the basal edge of the peristome is longer and more quadrate ; in this latter respect, as well as in contour and shape, the new shell more resembles *Corilla odontophora*. The specimens were all collected on the edge of a jungle where a new clearing was being made, on the Albion Estate, Lindula District, Ceylon (figs. 2, 4, 5, 6).

Several of the specimens being more or less weatherworn, I had the less compunction in breaking away parts of the walls at various points, so as to examine their internal structure thoroughly, and to report thereon with precision. To enable the reader to understand the following remarks, I will here mention that those teeth or plates found on the inner wall of the shell are known as *parietal*, while those on the outer wall are called *palatal*.

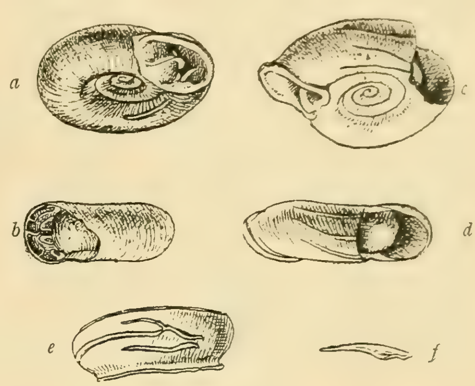
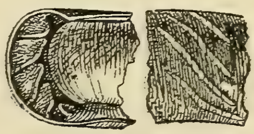


Fig. 4.—*Corilla fryae*.

In fig. 4*a*, the parietal plates are shown on the left and the palatal on the right of the aperture; the figure shows a perfect shell of *Corilla fryae*. To the left of the aperture the median plate will be observed reaching outwardly up to the extreme margin of the parietal callus, while the tips only of two other plates, one on each side of the median, can be discerned. I propose to designate them by numerals, and, beginning at the top of the shell, the first will of course be No. 1, the median No. 2, and the next No. 3, In fig. 4*b*, a part of the outer wall has been removed, and the edge thus exposed is shown perpendicularly to the line of sight; here on the right the curved and revolving parietal plates Nos. 1 and 3 show their inner terminations, while a reference to fig. 4*e* will explain why parietal plate No. 2 is invisible in the former figure, as it terminates at about half the length of Nos. 1 and 3, and there unites with the former. To return to fig. 4*b*, on the left four palatal plates will be observed, which will be numbered 1, 2, 3 and 4 respectively, from the top of the shell downward.

It will be noticed that No. 1 curves upwards towards the shell-mouth (not shown in the figure), while No. 2 interlocks between the parietal teeth Nos. 1 and 3, and as it curves upwards towards the

mouth, following for some distance the curvature of the second parietal plate, it is almost in juxtaposition with the latter; the third palatal plate also curving upwards, terminates below the third parietal one which curves downwards, and they therefore cross each other about the middle; No. 4 is situated very low down, close to the junction of the outer with the inner wall, and proceeds in an almost horizontal direction. These palatal plates are distinctly visible externally through the shell, and they are thus shown in figs. 4*c* and 4*d*, the latter figure exhibiting Nos. 1, 2 and 3, while the former shows Nos. 2, 3 and 4. The specimens delineated in figs. 2 and 4 are all mature, and as in this condition they are composed of 5 whorls, it follows that the plates are placed near the end of the fifth whorl. In fig. 4*f* the palatal plate No. 2 is shown by itself, the upper convex line indicating its attachment to the shell-wall. An interesting fact was revealed by the examination of an immature specimen received with the others; on breaking away the walls at various points, five palatal plates were observed in the fourth whorl, at a point which would be intersected by a line from the apex of the shell to the point where the plates would be found in the mature shells. This specimen is represented in figs. 5 and 6. On reference to fig. 5 it will be seen that the upper four of these plates are much broader than those of the mature shells, as they reach nearly to the inner wall and overlap, being placed close together, slanting upwards, but scarcely curving; No. 5 is very short and narrow, and corresponds in position to No. 4 in the older shells; fig. 6 shows the upper four plates in their immature position as seen through the shell. No plates being found in the fourth whorl of the mature shells, the inference is that as the shell is completed the plates first formed are absorbed by the animal, and this fact supports the view that the plates form barriers to exclude predatory insects. It may also be assumed that the animal produces similar plates from an early stage of its existence, absorbing them as each successive whorl with its complement of plates is completed; but this of course can only be demonstrated by the examination of a series of shells in various stages of growth. That structures of this kind serve as a means of defence was suggested as long ago as 1829 by Guilding, who, in speaking of the teeth and laminae of the Pupidae, observed that "they may answer the purpose of an operculum to keep out enemies, while they afford no obstacle to the motions of the soft and yielding body of the animal" ("Zoological Journal," iv., 1829, p. 168, footnote). As illustrating the vulnerability of unarmed shells, it may be mentioned that Jeffreys found a half-grown specimen of *Helix strigella* containing the larvae-form pupa of *Drilus flavescens*, the female of which has been named *Cochleoctonus vorax* from its snail-eating habit. He also found a similar pupa in a *Helix incarnata*, which, as in the case of *Helix strigella*, completely occupied the spire of the shell, of which it had devoured the former inhabitant ("Annals and Magazine of Natural History" (3), vi, 1860, p. 348). Of much interest is a note by Lt.-Col. Godwin Austen, who, in a paper on the Asiatic landshell genus *Plectopylis*, states that "when breaking up a number of shells to expose the barriers and ascertain if their characters were constant, I was greatly interested to find in two instances the presence of small insects that had become fixed between the teeth." He further remarks that those shells possessing such bars to the predatory visits of insects, such as certain kinds of beetles, ants, or even leeches, all of which swarm in the forests where the shells are found, would have the best chance of surviving. ("Proceedings of the Zoological Society of London," 1874, p. 611.)

5  6

Figs. 5 and 6.—*Corilla fryae*, immature × 2.

a b c

Fig. 7.—*Corilla erronea*.

In fig. 7*b*, a portion of the inner side of the outer wall of the allied species, *Corilla erronea* (Ceylon), is shown with the plates *in situ*, disposed in much the same manner as in *Corilla fryae*; they are, however, shorter and less curved; the parietal plates are almost identical in position and shape with those of *Corilla fryae*, as shown in fig. 7*a*, but they are shorter and the union of Nos. 1 and 2 is not so complete. Fig. 7*c* shows a specimen sideways, which is of interest on account of a small adventitious tooth between palatal plates Nos. 2 and 3.

In figs. 8*a* and 8*b* *Corilla rivolii*, of Deshayes (Ceylon), is delineated, the latter figure showing the remarkably reflected lip, and the three parietal plates, of which Nos. 1 and 3 are much more exserted than in the two previously-mentioned species; the palatal plates also reach much nearer to the edge of the lip than in the other two species, but they are not shown in the figure, as the mouth

of the shell was turned too far to the left. Fig. 8*a* shows the same shell with part of the outer wall removed, from which it will be seen that the arrangement of the plates is similar to that in *Corilla fryae* and *C. erronea*; there is, however, what appears to be a small adventitious palatal plate or tooth between Nos. 3 and 4, but this was not found to be constant in other specimens of this species which I examined, and it may therefore be assumed that this is an abnormal case. Since writing the above, Mr. Ponsonby has kindly


Fig. 8.—*Corilla rivolii.*

placed at my disposal two immature specimens of *C. rivolii*, the examination of which bears out the statement already made, that plates are formed at the various stages of growth, which are afterwards absorbed. These two specimens are shown in figs. 9*a*–9*f*, of which *a*–*e* exhibit one with four whorls completed, having five palatal plates, which resemble those of *Corilla fryae* (figs. 5 and 6) in being different in character from the mature plates. Here again they are much broader, they are also seen to be triangular, to overlap and to reach almost to the inner wall; no parietal plates are present. In fig. 9*a* the palatal plates are shown as seen on looking into the aperture, in fig. 9*b* they are looked at more from below, the shell being tilted a little. In figs. 9*c* and 9*d* they are shown as seen externally through the shell-wall. In fig. 9*e* the same specimen is depicted, seen from above, the dagger indicating the place

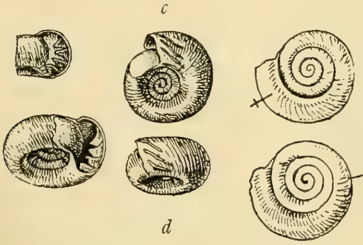



Fig. 9.—*Corilla rivolii*, immature.

where the plates are found. Fig. 9*f* shows another immature specimen, the dagger here also indicating the position of the plates; but while in the former specimen they are placed at the end of the fourth whorl, they are here found at a place where only three and-a-half whorls have been completed. Lt.-Col. H. H. Godwin Austen, in a letter, confirms my surmise as to the temporary character of these plates, stating that those found in the old shells differ very much from what those found in the young might be supposed to develop into. He thinks that the early folds are absorbed to make way for subsequent ones. As will be seen from the consideration of *Corilla odontophora* further on, however, this is not always the case, since in one mature specimen I have found the immature palatal folds still existing.

*Corilla odontophora* does not seem to be well understood, and the figure given in Tryon's "Manual of Conchology" (2), iii., t. 33, f. 34, copied from Hanley and Theobald's "Conchologia Indica," t. 57, f. 6, is somewhat misleading, as it evidently represents an immature specimen, showing the palatal folds as they appear from the aperture, but no reference is made to this fact. Mr. Ponsonby having in his possession two mature specimens, which he doubtfully referred to this species, kindly permitted me to open one, which is shown in figs. 10*a*—10*e*. On reference to fig. 10*b* it

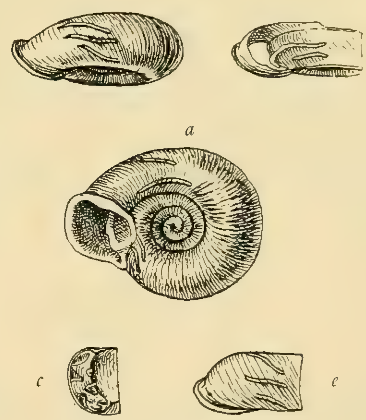



Fig. 10.—*Corilla odontophora.*

will be seen that only two parietal folds are present, corresponding to Nos. 2 and 3 in the previous species. Fig. 10*c* exhibits the plates as seen from behind their inner terminations, and it will be observed that there are four palatal folds, the upper three of which are shown through the wall of the shell in figs. 10*d* and 10*e*, while fig. 10*a* shows the entire shell from below (restored), with plates Nos. 3 and 4 showing through. On comparison with the figures of *Corilla erronea* and *Corilla fryae*, it is seen that in *Corilla odontophora* the palatal folds are much shorter and less flexuous than in the two former, and, as correctly stated by Benson in describing this species ("Annals and Magazine of Natural History" (7), xvi, 1865, p. 175), they "are entirely visible from the aperture." Another point to be noted is that the outer terminations (*i.e.* nearest the aperture) of the upper three palatal folds form an oblique line parallel with the peristome, the first one being nearest the aperture, while in *Corilla*

*erronea* and *Corilla fryae* they form a semicircle, the second fold being nearest the aperture. The shell of *Corilla odontophora* is more regularly and less coarsely ribbed than that of *Corilla erronea*, and larger, although composed of only 4–4½ whorls, while the other two species have 5 whorls; it differs further from *Corilla erronea* in that the last whorl is more deflected in front, more tumid, and then suddenly contracted behind the peristome, more resembling *Corilla fryae* in these respects, as also in the presence of a quadrate tooth on the basal margin of the peristome. Before concluding the consideration of this species, I would draw attention to fig. 10*a*, in which, though the shell is adult, is seen the immature form of palatal folds immediately behind the callus of the mouth, and, as already mentioned, a circumstance which shows that the earlier folds are not invariably absorbed on the completion of the shell.

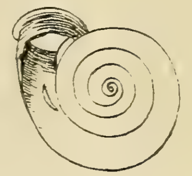


Fig. 11.—*Corilla humberti.*

*Corilla humberti*, also Cingalese, is extremely rare in collections. As Benson, in the paper cited above, throws some doubt on the correctness of Dr. Brot's figure of this species in the "Journal de Conchyliologie," xii., 1864, t. 2, f. 6, I was pleased to be able to give a new figure of it, and I am in a position to confirm Benson's conjecture that the original figure is slightly misleading, as the basal palatal fold appears to be joined to the suture owing to the position in which the specimen was placed, but on tilting the shell from the left side the fold is plainly seen to be unconnected with the suture, and it is thus shown in my fig. 11; this fold corresponds in position with No. 4 of the other species, while the parietal fold corresponds with No. 2 of the others. The specimen having been completely cut in half through the median plane, a close examination of the parietal fold reveals a slight fracture, and the inference forces itself upon my mind that, probably, in the process of cutting, it was partly cut away, and that it reached further back than it now appears. This form differs from the species already considered in having only one palatal and one parietal fold; it is also decidedly more rounded in outline, but like *Corilla odontophora* and *Corilla fryae*, it has a quadrate, but less elongate, tooth on the basal margin of the peristome.

The other species of *Corilla* will be considered in a future communication.

(*To be continued.*)

## MANGANESE ORES IN NORTH WALES.

By N. E. McIntire.

In the western part of Merioneth, the district of Ardudwy, beds of dialogite and peroxide of manganese have been occasionally worked during the last ten years. There are two interesting features about these deposits, viz.: the occurrence (comparatively rare, if we except the coal measures) of a strictly comtemporaneous interbedded mineral seam, and the chemical changes which have taken place along the outcrop and to a certain extent along the upper and lower bounding planes of the stratum.

Attention was shortly drawn to these facts by Mr. J. G. Goodchild in a paper on "Mineral Veins," read before the Geologists' Association in 1888, and in the "Geological Magazine" for January, 1887, there is an abstract of another paper on the subject, presented to the British Association by Dr. C. Le Neve Foster. Since these appeared, several openings have been made for mining purposes, and a few notes may be interesting.

The district of Ardudwy is covered with Cambrian rocks, known as the Harlech grits and Barmouth sandstones, which consist of a great thickness of conglomerates, grits and slaty beds, the last being of most frequent occurrence in the upper part of the series; their general dip is easterly, but the strata have been thrown into great rolls with usually a north to south axis. The hills of Diphws, Llethr and the Rhinogs, from 2,000 to 2,500 feet high, are composed of these rocks, which stretch eastward to the gold-bearing beds of the Tingula flags on the Mawddach. It is probable, though not proved, that most of the workings are along different outcrops of the same seam; but the ore is certainly found on other horizons, and a manganese staining of the beds is fairly common. It is chiefly in the valley of the little river Artro and its tributaries which drain the west slope of the Rhinog range that the mines have been worked. The outcrops range, as might be expected, from the dip, in a north and south line. In many places merely shallow trenches have been opened along the outcrop, and in the distance the excavations look like the course of a small railway traversing the hill-sides. One outcrop has been worked in an almost straight line for two miles north from the new church at Barmouth. In ascending Nant Col from the village of Llanbedr,

two outcrops of the same bed are crossed, and in one there, at the head of the valley near "the Pass of the Men of Ardudwy," is a large mine, with tramways and inclined planes laid down, but at present unworked; here the seam has been mined in places some way into the hill. In the valley of the Artro, itself about two miles from Llanbedr, the strata are horizontal, and the bed just below the surface has been eaten into with a network of tunnels and connecting galleries.

In many places the bed seems extremely impure, and beyond removing the surface-drift no attempt has been made to mine it. The deposit varies from a manganese-coloured slate to an almost white distinctly stratified ore, consisting of carbonate of manganese, with some twenty per cent. of siliceous matter. In one of the workings a bed of quartz grit occurs with a cement of oxide of manganese. Four feet is about the maximum thickness of the seam, and two and a half the average. It is well defined from the beds above and below; in most cases the change from an ordinary slate to the ore is quite abrupt.

On examining the ore as it lies about the workings (for no quarrying was in progress during my visits in 1894 and 1895) one sees two varieties—a grey rock, often very siliceous, consisting mainly of the carbonate, and a soft pliable black form, the hydrated oxide. The faces of the headings are all stained a dull violet, and the same tint is characteristic of the broken masses at the quarry mouth. The black variety is only found along the outcrop where the bed has been penetrated by fissures and cracks, along which it eats its way into the grey ore, forming a box-like covering to kernels of unaltered ore, the line of demarcation being perfectly sharp.

I was favoured by Mr. J. Abraham, of the Barmouth mine, with analyses of the two varieties by Messrs. Patterson and Stead, the leading points of which I produce.

| | *Dried at 212 degrees.* | |
|---|---|---|
| | *Black.* | *White.* |
| Peroxide of manganese | 34·48 | — |
| Protoxide of manganese | 11·83 | 29·48 |
| Peroxide of iron | 4·07 | 2·21 |
| Protoxide of iron | — | 1·03 |
| Alumina | 3·06 | 2·39 |
| Lime | 2·07 | 4·53 |
| Siliceous matter (see below) | 38·00 | 34·95 |
| Magnesia | 0·31 | 0·64 |
| Carbonic acid | 1·40 | 23·00 |
| Combined water | 4·60 | 1·35 |
| Sulphur | ·08 | ·08 |
| Phosphoric acid | 0·12 | 0·10 |
| | 100·02 | 99·76 |
| This gives metallic manganese | 35 °/₀ | 28·60 °/₀ |

The siliceous matter when further examined gave:

| | *Dried at 212 degrees.* | |
|---|---|---|
| | *Black.* | *White.* |
| Silica | 22·25 | 19·40 |
| Alumina | 8·25 | 5·85 |
| Protoxide of manganese | 5·21 | 7·44 |
| Peroxide of iron | 1·45 | 1·45 |
| Lime | 0·62 | 0·56 |
| Magnesia | 0·21 | 0·21 |

These analyses show what seems evident from the examination in the field, that the black ore is a product of alteration of the grey ore due to weathering. The grey ore contains in its ordinary state a certain amount of silicate as well as carbonate of manganese; it is, as Mr. Goodchild says, an impure mixture of dialogite and rhodonite. The alteration along the outcrop seems to me to exactly resemble the change which has occurred in the ironstone beds of the Northampton Sands. If one reads the account of these changes, in the "Geol. Survey Memoir," for example ("The Jurassic Rocks of Britain," vol. iv., p. 494), the explanation given there would exactly describe the changes in these Welsh ores, reading the word manganese for iron. The figure given of the brown ore, enclosing unaltered portions of carbonate, completely represents what is usually to be seen in these manganese mines.

I might add that the change seems to result in a diminution of bulk, so that more opening is given for the infiltration of surface waters.

It would be interesting to know whence came these large deposits of manganese. The black oxide is widely disseminated through all the stratified rocks, and I recently found a lenticular mass, some inches thick, in a Pleistocene flint gravel, resting on the chalk; deep-sea soundings also prove its presence in the ocean depths. The Cambrian beds, in which the ore is found, are themselves derived from the denudation of previously existing beds, about which we know so little.

The mines seem to be only worked at intervals, as the price of the ore permits. If 25s. per ton "placed on the rails," allows a profit to some favourably-situated mine, there must be others in the remote glens of Ardudwy, when this would be balanced by the cost of transit for several miles along mere cart tracks.

The iron-works of North Wales, when it is used in the manufacture of ferro-manganese, seem to be the usual destination of the ore.

*Harpenden, Herts; July. 1896.*

Science at Nottingham.—We have received the third supplement to No. 3 Class List (Science) of the Borough of Nottingham Free Public Reference Library. It is made up to April last. There are many additions since the last catalogue was issued.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*Continued from page* 72.)

## The Alder.

THE Alder (*Alnus glutinosa*, Gaertn.) is a tree of moderate dimensions, often little more than a bush, but in situations where the soil is tolerably good, or when growing on river banks or in marshes, it will attain a height of sixty feet and upwards.

The angle at which the branches leave the trunk is less than forty-five degrees, but they soon become horizontal or deflexed by reason of their own weight. In the ultimate sprays the smallness of the angle which they make with each other is very manifest. The length of the internode in vigorous,


Alder (*Alnus glutinosa*).
*a*, Embryo pistillate catkins; *b*, Embryo stamminate catkins.

The leaf-arrangement is commonly such that the cycle consists of three leaves, the fourth leaf standing vertically over the first, the fifth over the second, and so on. Thus the divergence of each leaf from the next (as viewed from the centre of the stem) is one-third of the circumference, whence it follows that the branches which arise from the axillary buds will stand more uniformly around the stem or shoot than in the elm or lime, where they are two-ranked.

leafy shoots is some two inches or more, but in the small flowering sprays it is only from one-eighth to five-eighths of an inch.

The group of catkins which constitutes the inflorescence is terminal. The staminate and pistillate flowers are borne in separate catkins. The staminate or male catkins are arranged in a raceme or small panicle, springing from the point itself of the branchlet, the pistillate or female catkins, which are smaller and fewer in number, are

grouped in a raceme which arises from the axil of the uppermost leaf; they are thus below, but in close proximity to the staminate catkins. In the autumn of each year we may find on the same branchlet pistillate catkins belonging to three successive seasons. Thus, on a branchlet examined, say, in September of the present year, 1896, we shall find, first, the dead woody remains of the catkins originally formed in 1894, which reached the flowering stage in 1895, but which did not mature and shed their seed until the winter of 1895–6. Second, those formed in the autumn of 1895, now green and plump, but which will not have matured their seed until late in the coming autumn or winter. Third, those which, together with the staminate catkins, are as yet in the embryo stage, and are to attain the flowering condition in the spring of 1897.

As in the case of maple and sycamore, the tendency to flower is first manifested by the small lateral branchlets, but it eventually affects the leading shoot also and, of course, prevents further lengthening of the shoot in the original direction. The diameter of the young yearly shoots of the alder is moderate, being about three-sixteenths of an inch.

There is a peculiarity about the axillary buds of the alder which is not, so far as I know, shared by any other British tree. Instead of being closely seated in the axil of a leaf, as in most trees, the bud is seated on a footstalk of one or more short internodes, and thus, as Schleiden pointed out, it has rather the character of a terminal than of an axillary bud.

In its main features the alder may be described as a tree of small or moderate size, with an upright trunk which preserves its distinctness nearly to the top of the tree, and gives off, even from its lower portion, strong diverging limbs, which in their turn put forth secondary branches, all of which, including the main limbs, terminate eventually in bushy masses of stiff, ascending, flowering sprays, but which have an irregular appearance, and in consequence of their alternate, instead of opposite, arrangement, and of the closer angle they make with each other, exhibit a very different appearance from the compact growth and even outline of the sycamore.

The leaves of the alder are somewhat small as to size, and their stiff footstalks keep them apart from each other, so that they do not overlap or present a continuous surface to receive the light; thus, although much broken up, the general aspect of the tree does not show any great variety of light and shadow.

*(To be continued.)*

## PULEX IRRITANS.

By John C. Webb, F.E.S.

In all probability the number of people who can truthfully claim to be unacquainted with the common flea is extremely limited. Most individuals know it only too well, especially those who have the misfortune to travel on railways, and these can testify as to its bloodthirsty nature, the skilful manner in which it comes to the attack, as well as the agility with which it evades capture. Notwithstanding all this, it is very rare to find anyone outside the ranks of entomologists who knows anything of the life-history of the flea. Most persons that I have met with are under the impression that the fleas are born very small and gradually grow larger, thus mistaking the male, which is smaller than the female, for the young insect, and the female for the one which has reached maturity.

Fig. 1. Fig. 2.
Fig. 1, Egg of Flea.
Fig. 2, Larva of Flea
(*Pulex irritans*).

It may not be uninteresting to some of the readers of this journal, therefore, if I give a brief description of the life-history of this terrible parasite, as verified by my own personal observations. The mature flea has already been so well described by more eminent entomologists than myself, that I cannot do better than repeat their description. It is of a dark brown hue, and oval shape, with small roundish head, having eyes on either side, and furnished with formidable mouth organs, consisting of the lancets, etc., which it uses so effectively in wounding its victim, and two four-jointed antennæ. The thorax is composed of three segments, each consisting of an upper and lower piece, and from the latter arise the six legs which are so admirably formed for leaping. The first joint of the leg or coxa is rather thick, then follow the trochanter, the fermin, the tiba, and lastly the five-jointed tarsus which terminates in two curved claws. The abdomen consists of nine rings, the last of which contains the pygidium, so frequently used by the older microscopists as a test object for a good half-inch objective, and respecting which there has been much dispute in days gone by. As already stated the male is considerably smaller than the female, from which it may readily be distinguished.

After pairing has taken place, the female deposits

her eggs, which vary from six to eight in number, in some convenient crevice or corner. These hatch out in the space of eight to fourteen days, according to the season of the year, and an exceedingly minute larva emerge from such. These are of a white colour with scaly heads furnished with two small antennæ but no eyes, so far as I have been able to trace. Their body consists of thirteen segments terminating in two small hooks. They attain their full growth in about twelve days, and then change into chrysalides, from whence they emerge perfect fleas in the course of another twelve days.

The above facts can readily be verified by any microscopist who will take the trouble to capture a pair of the mature insects, and confine them in a test-tube with some cotton-wool, and providing the necessary food during the experiment. The tube should be covered with a piece of silk or fine muslin and not with a cork, as the latter prevents a proper admission of air.

The accompanying sketches are from photographs taken from life, and will help to make these notes more intelligible.

32, *Henslowe Road, Dulwich, S.E.*

## THE CHEMISTRY OF PAPER.

By H. H. Francis Hyndman, B.Sc.

PAPER, from whatever source it is prepared, consists, fundamentally, of a substance known as cellulose. This remarkable material belongs to the carbohydrates, so called because they were supposed to be compounds of carbon with water; sugar and starch belonging to the same class.

Cellulose is the framework of plant-tissues. As our readers, no doubt, know, plants require for life carbonic acid from the air, water and small quantities of mineral substances which do not affect the present remarks. From the first two of these, plants make cellulose, which they want, and oxygen, which they excrete.

Cellulose, however, has also been found in certain low forms of animal life, so that its presence or absence can no longer be considered in separating the two great divisions of the organic world.

The most superficial observation of papers as they are put on the market, shows that they differ very considerably in their properties; some are tough, and do not become yellow or rotten even with long keeping, while others, like that used for some of the London and other evening journals, do not even wait to be kept to fall to pieces, but have been known to do so on the day of issue.

On looking closer we find that papers can be roughly divided into three groups, viz.: papers principally made from: Class 1, linen or cotton refuse; Class 2, celluloses derived from straw, esparto grass or wood; Class 3, mechanical wood-pulp. These classes are put in the order of their merit, Class 3 being absolutely worthless for any paper that is intended to last at all; Class 2 is not advisable for books of the slightest value, although, unfortunately, many valuable books have been and are still printed on this class of paper, in spite of wailings from the British Museum authorities and others.

Before considering the causes of the variation in the properties of different papers, it will be well first to get some idea of the properties of the basis of all papers, *i.e.* cellulose itself. The purest cellulose that can be bought is the best chemical filtering paper, and for those who are not acquainted with this, the best white cotton wool. Good linen and cotton fabrics and the papers made from scraps of these (Class 1, above) contain very little else than cellulose, and that little mostly of a mineral nature.

We will now suppose a few simple experiments, using cotton wool or the best unsized paper. When this is dipped for a few seconds into a cold mixture of sulphuric acid and water, in about the proportions of one to three, and is at once thoroughly washed, it gives a parchment paper of much the same kind as that used for tying down pots of preserve. If a drop of a solution of iodine is put on this it will turn it blue, and it is thus found to be of the same nature as starch, which also gives this blue colour with iodine. Cold strong nitric acid used in the same way as the sulphuric gives what is known as toughened paper, but which has no particular use. If, instead of using these acids singly and cold, we mix them and use them warm, there results a most remarkable series of compounds. A mixture of three parts by weight of sulphuric and one of nitric acid at 50° F. gives a substance which is known as cellulose hexanitrate, and which is the best gun-cotton. This is quite insoluble in a mixture of alcohol and ether, though they easily dissolve the inferior kind of gun-cotton, consisting principally of the pentanitrate. Still lower nitrates are obtained by using a warmer and more dilute mixture for a shorter time.

These lower nitrates, when dissolved in alcohol and ether, give the solution of collodion, used for many purposes, and when they are worked up with camphor and other substances, form the many useful substances known as celluloid, xylonite, etc. A still more curious use is that of spinning the collodion into a continuous thread, which,

after further treatment, is woven and sold as silk, as it resembles the natural article closely and is somewhat cheaper.

Very few plants, except cotton and flax, yield simple cellulose; in most the cellulose is combined with oxygen, giving a substance known as oxycellulose. This forms the principal part of the hard tissues in the plants which fall into the Class 2 above. By far the greater number of plants which have any hard parts consist of a still more complicated substance, this is a compound of a substance known as lignone with oxycellulose, which, as shown above, is itself a compound of cellulose. This compound is known as lignocellulose. Jute fibre is the best example of lignocellulose, as it is more free than ordinary woody fibre from other bodies. Jute is the bast of the genus *Corchorus*, belonging to the order Tiliaceæ; the material used by gardeners for tying-up plants is another example of bast fibre.

Lignocellulose has the remarkable property of fixing most of the coal-tar colours; in this it resembles silk and wool, and differs considerably from pure cellulose (cotton), which requires the use f some additional substance known as a mordant; alum and tannin are examples of two different classes of mordants. To fit woody fibre for use in the manufacture of even the cheapest paper, it undergoes, as a rule, two processes at least—first bleaching, second, boiling in a strong soda solution. The first process consists of acting on the pulped fibre with solution of bleaching powder, this combines with some of the noncellulose, *i.e.* lignone, etc., causing it to be soluble in the alkaline solution with which it is next treated. This has to be repeated if a white pulp is desired. Pulp treated in this way is the Class 3 mentioned in the beginning of this article. For the wood cellulose mentioned in Class 2, the lignocellulose has to be completely broken up, leaving an oxycellulose. This is accomplished by boiling in closed vessels, at a temperature above the boiling point of water, with strong alkaline (soda) solutions.

We have thus seen how the three classes of paper materials mentioned above are obtained. As the subsequent processes which convert them into paper are mostly mechanical, we will leave them as pulp ready for the machines.

5, *Denning Road, Hampstead, N.W.*

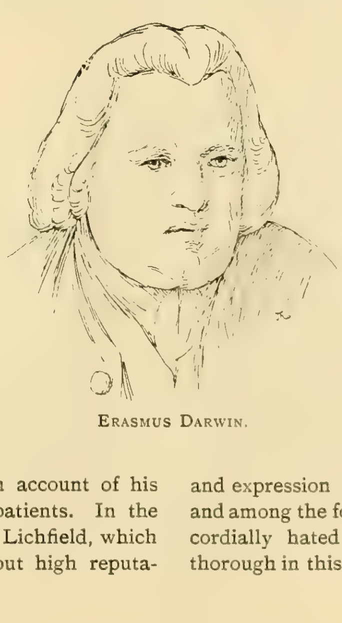
# SCIENCE AT THE NATIONAL PORTRAIT GALLERY.

By John T. Carrington.

(*Continued from page* 66.)

### Erasmus Darwin (1731-1802).

In the remarks upon the late Charles Robert Darwin (*ante* p. 2), mention was made of his ancestor Erasmus, who was born at Elston Hall, in Nottinghamshire, on December 12th, 1731. At the age of ten years, Erasmus was sent to school at Chesterfield, and nine years later he was entered at St. John's College, Cambridge. In 1754 he graduated B.A., and came out first of the junior optimes. In the autumn of that year Erasmus Darwin commenced the study of medicine at Edinburgh, and in the following year he took his M.B. degree at Cambridge. In 1756 we hear of Erasmus settling at Nottingham as a physician but, as may be well imagined, on account of his youth, he found an absence of patients. In the following November he moved to Lichfield, which city provided not only patients, but high reputation. At Lichfield when he found opportunity, Erasmus worked steadily at the study of Botany. This pursuit and his profession brought him in contact with many well-known men of his time. With those of his neighbourhood he formed a small society for general scientific intercourse, the meetings being held at each others houses, and affectionately termed by Erasmus, "our lunar meetings." Among the local men of the period who formed this association, were Watt, Wedgewood, the Sewards and others. Darwin fully held his own place at these meetings, being clever and an excellent talker, though occasionally a bad stammerer. His great freedom of thought and expression formed enemies as well as friends, and among the former was Dr. Johnson, who was as cordially hated in return by Darwin, he being thorough in this as in all else he undertook. He was



Erasmus Darwin.

twice married, first in 1757, to Miss Mary Howard, who died in 1770. She seems to have been a woman of tact and affection, for they lived very happily until her death. His second wife, whom he wedded in 1781, was the widow of Colonel Chandos-Pole, of Radbourne Hall, whose acquaintance he had made during his medical practice, and he is said to have been passionately attached to her before her husband's death. His new wife, disliking town life at Lichfield, they removed to Radbourne Hall, thence to Derby, and later to Breadsall Priory, where Dr. Erasmus Darwin died of heart-disease in 1802, having been in his latter years of great bodily size, even to unwieldiness. Although irritable of temper to a degree, and dictatorial in his manner, Dr. Darwin was surprisingly beloved by those who knew him intimately. As a worker he was insatiable, even having his carriage fitted for writing and reading in the intervals between his visits to patients.

Dr. Erasmus Darwin's earliest literary work was poetic. His first poem, although written in his Cambridge undergraduate days, appeared in the "European Magazine" for 1795. A collection of his poems was published in 1807. It is strange to find the poems of a man who was by no means of an effeminate or handsome type, infused with eroticisms and to hear of his love adventures; for few men have shown more vigour, at times approaching to roughness.

Dr. Erasmus Darwin's chief scientific reputation was founded on his knowledge of medicine and botany. In a public-spirited manner, rare at the time, he purchased and laid out as a botanical garden, in 1778, eight acres of land near Lichfield. His professional reputation extended over the country, until George III. invited him to come to London as his physician. Dr. Darwin, however, refused.

The painting of Dr. Erasmus Darwin in the National Portrait Gallery is by J. Wright, A.R.A., and represents the head and shoulders only.

### Oliver Goldsmith (1728-1774).

So much has been written about this versatile and convivial Irishman, the author of "An History of the Earth and Animated Nature," that it seems to be only covering too familiar ground to give any long account of his life.

From the point of view of a writer on scientific subjects, Oliver Goldsmith based his reputation upon his "Animated Nature," for the rest of his long list of literary productions are on topics far from the dry bones of Science. They cover a great range of subjects, from political economy through history to fiction, the drama and poetry. Many are the stories about his talent, indiscretions, poverty and conviviality.

Oliver Goldsmith was second son and fifth child of Charles and Ann Goldsmith. He was born at Pallas, near Ballymahon, in co. Longford, on November 10th, 1728. His father was curate of a country church, but perhaps most occupied in cultivating the glebe farm, until he became rector of Kilkenny West, two years after Oliver was born.

Oliver, like many another brilliant man, was considered in his childhood to be densely stupid, though he early showed indications of clever versification. After a desultory course of somewhat varied schools, on account of his father's straitened circumstances, Oliver was sent to Trinity College, Dublin. There he did little good, and after leaving entered upon one of the most remarkable careers on record; always in poverty, ever merry and full of Bohemian adventure. Unfortunately it is well-nigh impossible to separate the ficticious from the true history of his life, for few people have more delighted to astonish their friends with travellers' tales than Oliver Goldsmith. One fact seems to be established, viz., that he did much of his wanderings on foot, without money, but with merry song, story, or his flute to encourage hospitality. He said he travelled through Europe, from Holland to Italy and back, but where he really went will never be known, for Goldsmith's love of fiction in time perverted even his own memory.

Oliver Goldsmith.

Suffice it to say that Goldsmith's literary remains are among the most delightful of the English classics. Some will live for ever, such as the "Vicar of Wakefield," "The Deserted Village," "She Stoops to Conquer"; not forgetting the story of "Little Goody Two-Shoes." His "Animated Nature" was published after his death, which occurred on April 4th, 1774.

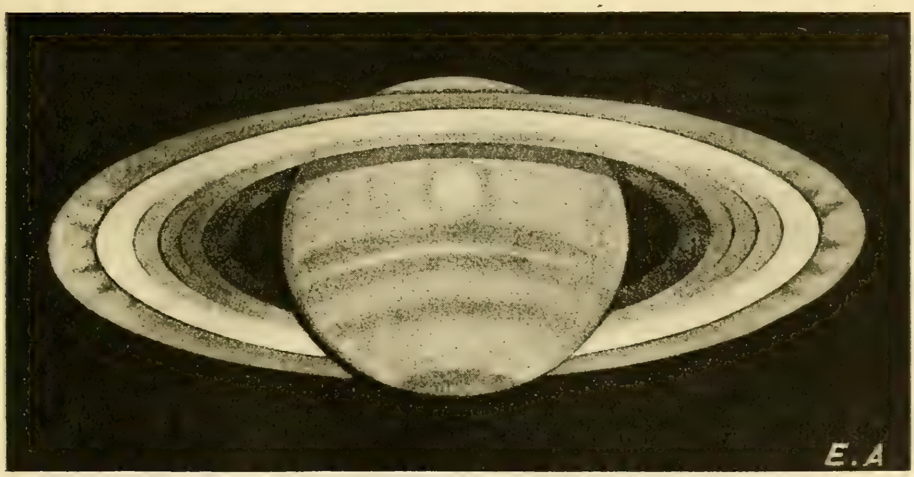
The picture in the National Portrait Gallery is a copy of one by Reynolds, but the best likeness is said to be at Knole Park, near Sevenoaks, in Kent.

As an incentive to many people to take an interest in natural history, "Animated Nature" doubtless fulfilled its mission a century ago. It was never a scientific work, and was probably a compilation when the author had become a literary hack in sore need of the money doled out for its production. It was, however, considered a remarkable work in its time, but is now relegated to an upper shelf, where it still remains in a modern library. *(To be continued.)*

# SATURN'S RING SYSTEM.

By Frank C. Dennett.

THIS wonderful object, as seen through a good instrument, is perhaps the most beautiful in the heavens. Ever since its discovery, it has proved itself to be a grand puzzle to those who have studied it. The outside diameter of these rings reaches about 170,000 miles, and the inner diameter of the bright ring about 106,000 miles. Notwithstanding this immense area the total thickness is probably not over about 100 miles. The first problem to consider is how can the rings be stable? Kepler's laws show that it is necessary for the inner portion to travel much faster around the planet than the outer portions. This demonstrates that it is quite impossible for the ring to be a solid continuous surface.




Saturn's Rings.

Perhaps some reader points out the fact that the rings are not continuous, but that divisions separate the surface into concentric rings. The problem, however, is not ended here, because as early as 1821 Kunowsky noticed that the rings, though so close together, were not in absolutely the same plane, and Coolidge, Secchi and others have made similar observations. But this is not all. The ball is not placed in the centre of the rings, but a little on one side, making the eastern, or *f*, ansa a little the largest. The consequence of this eccentricity would be to make the different parts of the same ring travel at different rates, faster on the western, slower on the eastern side of the ball. These considerations render untenable any idea of the ring being solid.

Variations are constantly being noted in the rings which tend to prove this contention. Sometimes the principal, or Ball's, division appears hard and sharp, and black, whilst at others, notwithstanding beautiful definition, the edges of this division refuse to appear hard, and at times are even jagged—*vide* Trouvelot's observations, very specially, December 30th, 1874—and the division itself has frequently been observed by many observers, including the writer, to be very far from black. Usually a large instrument brings out the Encke division of the outer ring about three-fifths from its inner edge, sometimes as a black division and at others only as a pencil-line. Often, however, it is only visible on one side of the planet, whilst at times it seems to be quite invisible. Again, it seems sometimes to slightly vary its position on the ring, whilst occasionally it has been seen accompanied by two or three other divisions on the same ring. M. L. Trouvelot has sometimes seen the outer ring apparently partially broken into fragments at the ends of the ansæ, and very occasionally this has been confirmed by other observers.

M. E. Antoniadi, of Juvisy, on April 18th, 1896, made a most interesting observation of Saturn. His beautiful drawing is here reproduced from the "Bulletin de la Société Astronomique de France" for May, and which has kindly been forwarded by the observer. Here, not only are the mottlings of the outer ring visible, but the divisions are absent, whilst the middle bright ring has three divisions which are very rarely seen. It appears that the

brighter portion of the rings has slightly increased in width since the latter part of last century.

Again, it is very hard to believe that the inner dark ring, usually known as the "crape veil," has not become far brighter during the present century. In 1880 the writer could not possibly have overlooked it with a 4½-in. silver-on-glass Newtonian. But early in the century Sir J. Herschel and Schroeter were studying the planet with mirrors more than four times that aperture, and overlooked it altogether. That it was in existence is well known, for in 1715 the younger Cassina saw it where it crossed the planet. But it was not until 1838 that Dr. Galle, of Berlin, saw something of it, and not until the autumn of 1850 that Bond and Tuttle, in America, and W. R. Dawes, in England, discovered its true character. These things added to the laws of motion seem to definitely point out the fact that the rings, so far from being solid, are really composed of a multitude of little bodies travelling around the planet. Long ago the younger Cassini suggested something of this sort, and now in later times Professor J. Clark Maxwell and R. A. Proctor have advocated the same explanation.

The spectroscope is a marvellous instrument for answering difficult questions, and in 1895 Professor Keeler, of the Alleghany Observatory, applied it to the study of the rings of Saturn, It has long been known that if a star were approaching the observer the dark lines in its spectrum were displaced towards the violet, whilst if the source of light were receding the displacement was towards the red. More than that, the amount of the displacement varied according to the rate of such motion. The application of this method of research to the rings of Saturn shows that the inner portion of the ring of the eastern or following ansa at its broadest part is travelling towards us at a certain rate, the outer portion of the ring is also approaching us at a certain rate. In the opposite ansa the motion is of course from the observer. Were the bright rings a solid plane the motion of the outer edge would exceed that of the inner almost as 5 : 3, so that if the slit of the spectroscope were laid along the equatorial diameter of the planet and rings, the inner edge on the *f* side would displace the lines towards the violet, and the displacement would be increased to the outer edge. But what are the facts? The displacement is greatest at the inner edge, proving that the motion is there greater than at the outer edge. Thus for ever the idea of solidity is disposed of, and it may be taken as, to all intents, proved that the rings are really composed of a multitude of tiny bodies pursuing their course around the planet. It must be conceded that our knowledge of Saturn and his system has been definitely advanced.

*60, Lenthall Road, London, N.E.; August, 1896.*

## SUBDIVISION OF CLOSTERIUM LUNULA.

By H. E. Griset.

IN addition to the true conjugation of those beautiful unicellular algæ, the Desmidiaceæ, by the mutual action of two individual fronds and the resulting sporangium, there is the vegetative multiplication by duplicative subdivision which continually takes place throughout the warmer months of the year in the mature cells or fronds. In this state they appear from time to time on the slide under the microscope, and it is generally conducted with great rapidity. This seems to vary according to the temperature, as may be seen from the following notes, which may, perhaps, be useful to those who have not been fortunate enough to have witnessed this curious and instructive phenomenon.

The sub-lunate fronds of *Closterium lunula*, when about to undergo this transverse subdivision, exhibit at first an infolding of the walls of the cell at the middle. This constriction continues to increase until the primary frond is completely divided into two similar halves, which takes several hours. They generally become detached by a jerking of one of the new cells—the active one, (fig. 1, A), while the other remains passive (B); or they continue to slowly swing from side to side. The half-fronds are horn-shaped and rounded at the newly-divided end, near where the green endochrome at this time presents a deep constriction, and the internal movements of the parietal protoplasm will be seen to be very active, presenting numerous little shadowy waves, which carry the round particles along with them; some of these ultimately become enclosed in the vacuole which has in the meanwhile been formed in the rounded end of the cell; one of the new cells did not form this vacuole until fifteen minutes after the other (the passive one), the protoplasmic currents simply proceeding round the end, which had previously been the case with the other cell.

Fifteen minutes after the perfect division of the frond (as seen in fig. 1) the new cells were elongating and tapering at the extremities, the rounded ends having become decidedly pointed and the active frond had formed the vacuole at its new end; the constriction of the endochrome was greatly augmented, the vacuole of the passive cell still contained two and that of the active cell one granule (fig. 2).

Twenty minutes from the perfect division, or five minutes later than the preceding, the cells continued to lengthen and the vacuoles of the passive and active fronds contained three and two granules, respectively (fig. 3). Thirty minutes after the perfect division the extremities of the new fronds were almost equal in shape, the

endochrome had become quite divided in the centre and the vacuoles of the new ends contained three granules in each; until now the active frond had continued to slowly swing from and towards the passive one (fig. 4).

At fifty minutes from the division of the cell the ends were about equal; the vacuole of the passive frond contained five granules, and that of the active one three. The latter now had quite ceased to swing from and towards the other; it had, in fact, become passive (fig. 5).

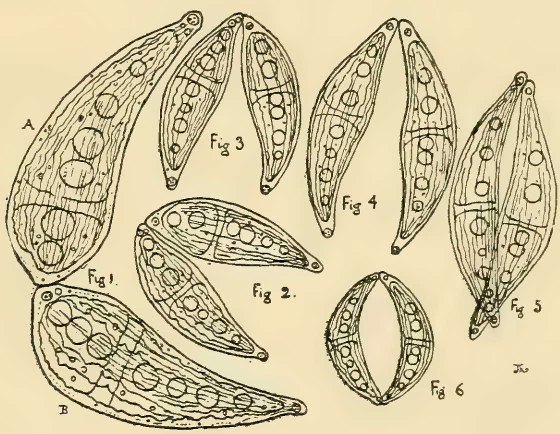
Sixty minutes after the complete division, both the new cells had lengthened and curved, so that they closely resembled the normal fronds in form, except being a little more slender perhaps (fig. 6). When this alga is actively dividing, several pairs may sometimes be seen on the same slide which have just completed this metamorphosis. The temperature at the time of this observation was about 16° C.

The vacuoles at the apices of the cells constantly alter their places in the hyaline motile protoplasm, and contain watery contents in which the minute corpuscles rotate. The way they enter the vacuole is very curious: at first they are seen to approach it and then are passed through its side, in the same way as the "sarcode" of the Amœba encompasses a food particle.

But of 321 fronds of *Closterium lunula* examined in October, 1895, there were only seven undergoing this change, and when we consider that it requires only a few hours to complete this division, after which the fronds remain several days, or even weeks, before they again subdivide, it is not surprising that they are not more frequently observed in this state. By having a large slide covered with a film of the *Closterium*-bearing detritus, and examining this under a one-inch objective will not fail to show some fronds in this state after a few repetitions of the examination at the proper season. *Closterium lunula* is exceedingly common in the large lake in Beech Park, near Hadley, along with *C. acerosum*, *C. lineatum*, etc., and many beautiful diatoms.

The membrane of the Closteria is more or less horny and often brownish, especially in the old fronds, and is either smooth or marked with longitudinal striæ, as in *C. strialatum*; this species was very abundant in a little pond (or rather, puddle) on Hampstead Heath, known locally as the Duck Pond, and also in the Viaduct Pond in the same locality.

3, *Cathcart Hill, London, N.; July*, 1896.




SUBDIVISION OF CLOSTERIUM LUNULA.
Fig. 1.—A frond just dividing × 350. A, active, and B, passive cells.
Figs. 2-5.—Later stages of same × 200.
Fig. 6.—Two perfect fronds × 100.

SUNDAY SCIENCE LECTURES.—The Select Committee of the House of Lords appointed to consider the expediency of amending the Lord's Day Act of 1781, has issued its report. This old Act enables anyone to prosecute the promoters of Sunday recreation, no matter how innocent, if conducted at a profit to any person or body corporate. After examining a mass of evidence their lordships point out that the Act of 1875 (38 and 39 Vict. c. 80) makes private prosecution improbable, as the Crown has power to remit penalties and to quash frivolous or vexatious prosecutions. Their lordships think that, while the phraseology of the earlier Act is now out of date, and its alteration, if practicable, would be advantageous, the existing law, as laid down in the two statutes, 21 Geo. III., c. 49, and the Remission of Penalties Act, meets the sentiments of the English people, and that any material change in its general provisions might not be for public good.

## THE BRIGGS COLLECTION.

IT is seldom that such a fine collection of Natural-history objects is dispersed by an auctioneer as that to be sold by Mr. Stevens, at Covent Garden, this autumn, and formed by Mr. Chas. A. Briggs. It consists entirely of British lepidoptera, as its present owner retains his further collections for continued scientific study in other directions.

The sale will occupy four days and part of a fifth. The dates are October 27th and 28th, November 24th and 25th, and upwards of one hundred lots, consisting of Eurodea, Crambidæ, plume moths and duplicates, will be sold on the 10th of November. Of course, it is always difficult to estimate in advance the probable amount which such a collection will realize, but we may imagine, when judged by recent sales, it will reach the total of a thousand pounds. The lotting has been most carefully arranged by Mr. Janson, jun., under the supervision of Mr. Briggs himself, and the catalogue will contain a full account of the more important. The first day's sale, October 27th, will commence with lots 1 to 323, and they will probably attract most attention, for they are of butterflies, with eight lots of the large-copper butterfly (*Lycæna dispar*). There will be another eight lots of this species on each day. The further lots are 348 to 535, containing the Sphinges and Bombyces; 536 to 557, Pseudo-bombyces; 558 to 715, Noctuæ; 716 to 901, Geometræ; 902 to 923, larger Pyrales, with the others mentioned for November 10th.

It will be readily understood that it would not be possible to give anything like a detailed description of such a large collection in these pages, but the following are some of the more remarkable specimens. The blue and copper butterflies, which will be in the first day's sale, will probably attract most visitors on account of the large number and range of the varieties. Among the species are thirty-two large coppers, and twenty-one of the scarce blue *Polyommatus semiargus* (*acis*), and twenty lots of *Lycæna phlœas*, with many beautiful varieties, and an almost unique collection of varieties of undersides of the blue butterflies. Other butterflies of exceptional beauty or rarity are fourteen *Argynnis latona*, *A. niobe*, var. *eris*, captured by Gerrard in the New Forest, and referred to in the "Entomologist" of June, this year. Mr. Briggs obtained this specimen from the Rev. Windsor Hamborough. Very fine varieties of the smaller fritillaries *Melitæa aurina* (*artemis*) and *M. athalia*; also of *Argynnis selene* and *A. euphrosyne*, also of *A. aglia*. There are forty-four specimens of the meadow-brown butterfly (*Epinephele ianira*), with the colourless splashes on the wings, so well-known to entomologists. There are also many varieties of *Vanessa io*, *V. atalanta*, *V. urticæ*, *V. c-album*, *Limenitis sibylla*, *Melanargia galatea*, *Epinephele tithonus*, *E. hyperanthes*, *Cœnonympha typhon* and *C. pamphilus*, also of *Syrichthus malvæ* (*alveolus*), and many others.

The hermaphrodite and gynandromorphus specimens include the species *Gonopteryx rhamni*, *Euchloë cardamines*, *Polyommatus bellargus* (*adonis*), *P. ægon*, *P. astrarche* (*agestis*), *P. icarus* (*alexis*), *P. argiolus*, and *P. corydon*. Specimens of the following blue butterflies show exchange of colours on the sexes: *P. bellargus* and *P. corydon*, females, more or less showing male colour; a female *P. bellargus* as bright blue as a male, and a male specimen looking dark as a female. Less remarkable, but exceptionally fine specimens of varieties occur in the series of *Papilio machaon*, *Pieris brassicæ*, *P. rapæ*, *P. napi*, *Colias edusa*, and indeed in nearly every other species.

There are also many extraordinary forms among the moths, such as a black privit-hawk moth, and some splendid tiger moths. One of these latter is the companion variety of *Arctia caia* (figured in the "Entomologist," vol. xxi., p. 73), rather better than that which was sold at the late Mr. Vaughan's sale for £15 15s. These were bred by Mr. C. H. Longley. Fine varieties also occur in the series of *Spilosoma lubricipeda*, *S. menthastri*, *S. urticæ*, and *Odonestis potatoria*. The burnet moths are simply splendid, and make thirty-four lots.

Of rare moths, the list would be too long to insert. We may mention, however, a series of fourteen *Deiopeia pulchella*, six *Lasiocampa ilicifolia* from the Standish collection, and a couple of Killarney *Notodonta bicolor*.

The collection will be on view at Mr. Stevens' Great Rooms, King Street, Covent Garden, on the days previous to, and on the mornings of, the days of sale.

J. T. C.

## THE NEW "FRENA" CAMERA.

MESSRS. R. & J. BECK, Limited, the manufacturers of the "Frena" Camera, have been devoting much time to designing a form of this hand-camera which, while not carrying too small a film, should be produced at a cheap price. The present "Memorandum" size "Frena" is the outcome of this work. The same adjustable form of shutter, diaphragms to the lens, the swingback and level, the finders, automatic indicator and all the advantages of the more expensive "Frena" camera have been retained, and the finish and workmanship is equal in every way.

The "Memorandum" size "Frena" takes pictures on films $3\frac{1}{2}$ inches by $2\frac{5}{8}$ inches. Forty films are carried in a pack as in the other "Frena" cameras. Although the operation of changing the film is effected as before, by turning the handle round half a revolution and back, the mechanism of the film-changing has been considerably altered. It is a noteworthy fact that forty exposed films may be taken out of the "Frena" and forty new films put in, including wrapping up the exposed and undoing the new packets of films, in less than three minutes. The shutter has different speeds, $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{40}$ and $\frac{1}{80}$ second, and also time exposures. For instantaneous exposures the set-off knob is pushed in, and for time-exposures the same set-off knob is pulled out, opening the lens, and then pushed in to close the lens. The swingback is obtained by simply tilting the holder in which the films are held, untl the bubble of the level in the handle is central, whatever the angle of the camera may be. This corrects the distortion that may be caused by pointing the camera up or down. The lens is then stopped down to correct any loss of definition that may be caused by the top and bottom of the film being out of focus. An indicator counts the number of exposures. The "Memorandum" size "Frena" weighs only $2\frac{3}{4}$ lbs. loaded with forty films. It measures $9\frac{1}{2}$ inches by 5 inches by $3\frac{1}{2}$ inches. Its small size and weight render it specially suitable for naturalists, cyclists, mountaineers and ladies. The price is £2 18*s*. 6*d*., and elaborate instructions for working the instrument are furnished. We can recommend this camera to our readers.

## BRITISH ASSOCIATION AND ISLE OF MAN.

AFTER the sixty-sixth meeting, which is to be held in Liverpool, from September 16th to 23rd, it has been arranged that there shall be a special scientific excursion to the Isle of Man, extending over five days, from Thursday, September 24th, to Monday, September 28th, inclusive.

The party will break up into four sections (I. Archæologists, II. Geologists, III, Zoologists, and IV. Botanists), to be conducted by competent leaders over those parts of the island which offer special attractions for scientific study. The geology of the Island is varied and interesting, especially as regards the dynamic alteration of the older Palæozoic rocks, the Volcanic series and the richly fossiliferous Limestone of the Carboniferous age, and the wide developments of the Glacial Deposits; the Prehistoric, Scandinavian and other early remains are celebrated; the marine fauna and flora are abundant, and the presence of the Liverpool Marine Biological Station at Port Erin affords facilities for dredging expeditions and other biological work.

The detailed programme for the several sections has been arranged by a Committee of the Isle of Man Natural History and Antiquarian Society, acting along with representatives appointed by the Liverpool Executive Committee for the British Association meeting; and a special handbook, containing a short account of the geology, antiquities, and natural history of the Island, illustrated by a geological map and a chart, has been drawn up by Mr. P. M. C. Kermode, Mr. G. W. Lamplugh, and Professor Herdman.

The tickets (including the hotel and other expenses while travelling in the island, and a copy of the handbook) will be three guineas each, and must be applied for (the applicant stating at the time which section he intends to join) before noon on Saturday, September 19th, at the Reception Room, Liverpool.

The party leaves Prince's Landing Stage, Liverpool, on Thursday, September 24th, at 11.30 a.m. The Isle of Man Steam Packet Company, Limited, have most courteously offered to convey the British Association party to and from the island, free of charge, by one of their best equipped and fastest steamers, which will probably make the passage in about three and a half hours.

### Section II.—Geologists.

Leaders: Professor W. Boyd Dawkins, F.R.S., and G. W. Lamplugh, F.G.S., of H.M. Geological Survey.

Thursday, 24th.—Reception by H.E. the Lieut.-Governor at Government House, etc. Head-quarters at Sefton Hotel, Douglas.

Friday, 25th.—Train at 9.30 a.m. to Castletown, arrive 10.7. Walk to Castle Rushen, and then on to Stack of Scarlet, and thence to Poyllvaaish (see Carboniferous Limestones and Contemporaneous Volcanic Series). Meet carriages at Poyllvaaish, lunch at George Hotel, Castletown, and drive to Langness (see base of Carboniferous Rocks and Skiddaw Slates), and then on to railway station at Ballasalla. Train or carriage to Douglas.

Saturday, 26th.—Electric railway at 9.33 a.m. to Laxey, and on to Snaefell. (General view of island, and Metamorphism of Skiddaw Slates.) Meet carriages near the Hut, and drive to Tholt-y-Will. Lunch 1 p.m., drive down the Glen, stopping at various points (see Crush-conglomerates of Skiddaw Rocks, etc.) on the way to Ramsey. Steamer at 6 p.m. back to Douglas.

Monday, 28th.—Carriage at 9.30 a.m. for Crosby, Rockmount (see intrusive dykes in Skiddaws), Lhoob-y-Reeast, Peel (see Red Sandstones, etc., Lunch at Greg Malin Hotel 1 p.m. (see Peel Castle, etc.) Drive to Foxdale (see Lead Mines and Granite outcrop), and then on to Douglas. Final dinner with the other Sections at Sefton Hotel, Douglas.

### Section III.—Zoologists.

Leaders: Professor W. A. Herdman, F.R.S., and I. C. Thompson, F.L.S.

Thursday, 24th. — Reception at Government House, etc., as before. Train at 5.10 p.m. for Port Erin. Head-quarters at Bellevue Hotel.

Friday, 25th.—If the weather is suitable, the day will be spent in dredging, etc., from a steamer, probably to the west of the Isle of Man. If dredging is impossible, there is shore-collecting, tow-netting in the bay, and work in the Biological Station to fall back upon.

Saturday, 26th.—Train at 10.40 to Castletown (arrive at 10.56). See Castle Rushen. Return to Port Erin by 12.22 train. Lunch at Bellevue Hotel. Take Section I. over Biological Station. Walk with Sections I. and IV. to Neolithic Circle on Meayll Hill. See Cregneish, Chasms, etc., and return to Port Erin.

Monday, 28th.—If weather is suitable take steamer to Ramsey, dredging on the way along the east side of island. Lunch at Queen's Hotel, Ramsey, 1 p.m. (If time permits join Section I. in seeing collection at Masonic Rooms.) Dredge from steamer on way back to Douglas.

### Section IV.—Botanists.

Leaders: Professor F. E. Weiss, B.Sc., and Rev. S. A. P. Kermode, M.A.

Thursday, 24th. — Reception at Government House, etc., as before. See Mr. Okell's Garden and Collection of Veronicas. Train at 5.10 (with III.) to Port Erin. Head-quarters at Bellevue Hotel.

Friday, 25th.—Carriages 9.30; drive by "Round Table" to Peel over the mountains. Lunch (with I.) at Creg Malin Hotel. See Castle, etc. Carriages to Foxdale, Malew, and back to Port Erin.

Saturday, 26th.—Train (or walk by shore) to Castletown. See Castle Rushen (with I. and III.) Train at 12.22 to Port Erin. Lunch (with I. and III.). Visit Biological Station and Port Erin Shore. Walk with I. and III. to Neolithic Circle on Meayll Hill, then on to Chasms, and back to Port Erin. There is good shore collecting at Port Erin, at Port St. Mary, and at various intermediate points.

Monday, 28th.—Train at 9.18 a.m. to Douglas. Carriages to Laxey, electric railway to Snaefell. Meet carriages near Hut. Drive to Tholt-y-Will. Lunch 1 p.m. Drive down Glen and through Curraghs (Marsh Plants) to Ballamooar, Jurby (Gardens, Conifers, etc.), back through Curraghs to Ballaugh railway station. Train at 5.10 p.m. for Douglas. Final dinner and stay night at Sefton Hotel, Douglas.

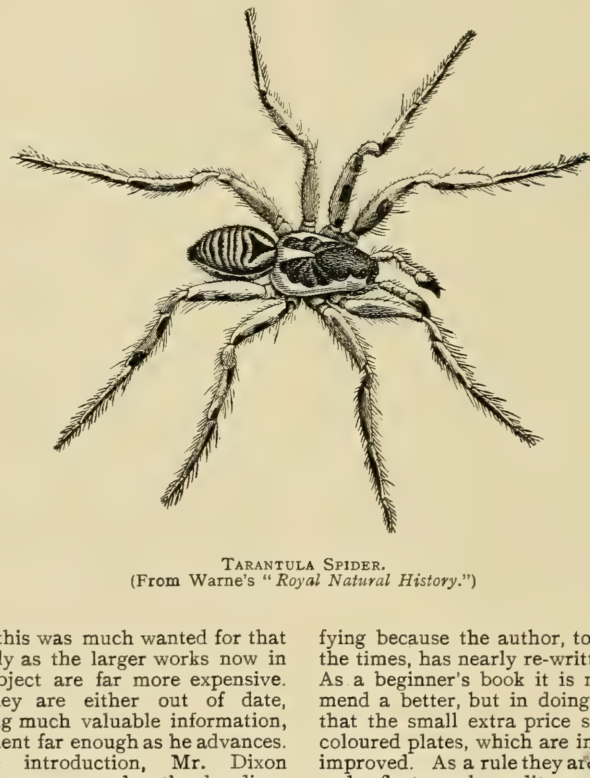
The Honorary Committee consists of His Honour Deemster Gill, J. W. Clinch, Esq., Rev. S. N. Harrison, B.A., P. M. C. Kermode, Esq., F.S.A.Scot., G. W. Lamplugh, Esq., F.G.S. for the Isle of Man Natural History and Antiquarian Society. Prof. W. A. Herdman, F.R.S., I. C. Thompson, Esq., F.L.S., for the Liverpool Executive Committee.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*The Student's Handbook of British Mosses.* By H. N. Dixon, M.A., F.L.S., with illustrations, and Keys to the Genera and Species by H. G. Jameson, M.A., pp. xlvi and 520 royal 8vo, and 60 plates. (Eastbourne: V. T. Sumfield, London: John Wheldon and Co., 1896). Price 18s. 6d.

Bryologists will rejoice at the issue of this fine work; botanists who have toyed with mosses have now no longer the excuse of difficulty of studying the British Moss Flora, on account of the absence of suitable literature, and beginners have an excellent guide. Those who depend on illustrations for identifying species will find the study of mosses made easy, for there are no less than 684 figures, some containing up to eight or ten drawings, charmingly executed by the Rev. Mr. Jameson. Our Moss Flora now enumerates about six hundred species, many of which have lately been added. It will therefore be seen that such a book as this was much wanted for that reason, and especially as the larger works now in existence on the subject are far more expensive. Of the smaller they are either out of date, or else, though giving much valuable information, do not carry the student far enough as he advances. In a sixteen-page introduction, Mr. Dixon gives a history of mosses under the headings "General Characteristics," "Vegetative Organs," "Reproductive Organs" and "Classification and Nomenclature." There is also a full glossary and instructions for taking microscopic measurements. Mr. Jameson's Key to the Genera will be found indispensable when once mastered. It occupies fourteen pages. The descriptions of species are lucid, and general information with each most useful. The classification is based on Schimper's "Synopsis Muscorum Europæorum," with such additions as are rendered necessary through modern knowledge. This has, of course, made some changes in arrangement, especially in the the separation of the Grimmiaceæ from the Orthotrichaceæ and their removal to the Aplolepideæ, and a few such changes in other groups. These make no difference in the general arrangement now adopted. The changes in nomenclature of species are fortunately not too many, on which we congratulate the moss-men, though no complete synonomy is given where changes have been made, reference is made to the more familiar names beginners have learned when working with other manuals. The localities given are general rather than special, excepting in cases of rare species, and then the list is as complete as possible. One feature of the work is perhaps rather dangerous, and that is the number of sub-species referred to; we never know where this sub-division may end; still Mr. Dixon seems to have done this part of his work with care and full criticism. As we have said the plates are admirable. The book is well printed, though, even at the cost of making two volumes, it would have been better to have used a little stronger paper, for this is a work which will have to stand much wear.

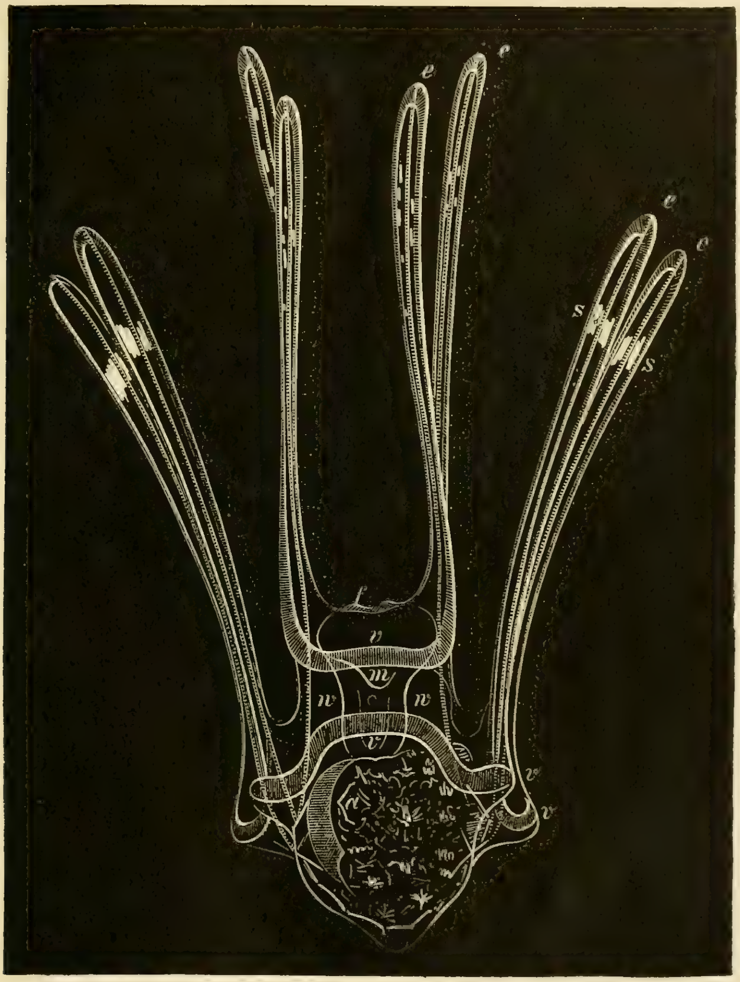


TARANTULA SPIDER.
(From Warne's "*Royal Natural History.*")

*The Collector's Manual of British Land and Freshwater Shells.* By Lionel Ernest Adams, B.A. 214 pp. 8vo, second edition, with 9 coloured and 2 plain plates, also other illustrations. (Leeds: Taylor Brothers, 1896.) Price 8s. plain; 10s. 6d. coloured plates, Postage 5d. net.

That Mr. Adams' well-known work on our native inland shells has gone into a second edition is most encouraging. This is the more gratifying because the author, to bring it abreast with the times, has nearly re-written many of the pages. As a beginner's book it is not possible to recommend a better, but in doing so we would suggest that the small extra price should be paid for the coloured plates, which are in this edition distinctly improved. As a rule they are all that can be desired and reflect much credit on the printer. A reproduced photograph by Mr. J. Wetherall, of the four smaller *Pisidia*, makes an admirable frontispiece to the book. Every species is represented by figures and descriptions, with particulars of their habits and localities; numerous named varieties are also noticed, this rather on the principle that those who do not like them may leave them. There is also included the Conchological Society's census of comital distribution. The illustrations are by Messrs. Gerald W. Adams, Alfred Sich and the author. The coloured plates are by Taylor Brothers, of Leeds, and are most successfully executed. The nomenclature is that of the Conchological Society's latest list. The information contained in

the introduction will be found most useful to the beginner and quite trustworthy. We believe this new edition of Mr. Adams' work will prove a great incentive to people to take up the study of our land and freshwater shells. No more interesting or handy group can be found for a British naturalist to investigate, as there are only about 127 species to overcome, with their varieties. This is rendered easy by aid of this manual, which will lead the student on to works of greater pretentions.




DEVELOPMENT OF A SEA-URCHIN: FULL-GROWN LARVA.
(From Warne's "*Royal Natural History*.")

*The Royal Natural History*. Edited by RICHARD LYDEKKER, B.A., F.R.S. Illustrated by 72 coloured plates and 1,600 engravings. (London and New York: Frederick Warne and Co.) Published in 1s. parts.

This work has reached Part 34, which is the last but one of the finest general work on natural history published in our language. It has maintained its high standard throughout, the articles having been written by recognized experts in their several subjects. It is thus fully up to modern knowledge in its information, and will long remain a book for handy reference on all zoological questions. We understand that the publishers have arranged to re-issue it in sixpenny parts. This new issue by no mean injures the value of the first edition, being practically the same, only that the parts are half the size of those at one shilling, and contain one coloured plate instead of two in each. Advantage has been taken of the new issue to correct several points in the letterpress and illustrations, so that it will be really a new edition as well as a new series. No matter how much inclined a young naturalist may feel to specialise his studies and confine himself to one subject, he ought to get this work to find out how one group of animals is related to and dependent upon the others. Part 34 is devoted to a portion of the Starfish and Mollusca. We show an illustration from the article on "Development of Sea-Urchins," and also one of a tarantula spider from another part of "The Royal Natural History."

## SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

Annali del Museo Civico di Storia Naturale di Genova (Genoa, 1896. Vols. xxxv. and xxxvi.). The whole of the first volume cited is occupied by the zoological results of the exploration of the Giuba and its affluents (North-east Africa), by Captain V. Bottego during the years 1892-93, under the auspices of the Italian Geographical Society. An elaborate map of the region explored forms a frontispiece to this volume. The secretary, Signor G. Dalla Vedova, contributes an introduction, from which it appears that the expedition started from Berber, and the distance traversed is estimated at more than 2,900 kilometers, through a region hitherto unknown to Europeans. The following specialists have contributed reports on their various respective departments. Mr. Oldfield Thomas, on the Mammals, Mr. G. A. Boulenger, on the Reptiles and Batrachians (with four plates); Signor D. Vinciguerra, on the Fishes (with one plate); Professor E. Von Martens, on the Land and Freshwater Shells; Dr. H. de Saussure, on the Orthoptera; M. A. L. Montandon, on the Plataspidinae; Dr. A. de Carlini, on the Rhynchota; Dr. Emilio Corti, on the Diptera; Dr. Paolo Magretti, on the Hymenoptera; Professor Carlo Emery, on the Formicidae; Dr. M. Regimbart, on Dytiscidae and Gyrinidae; Dr. E. Eppelsheim, on the Staphylinidae; Signor E. Brenske, on Melolonthinae and Rutelinae; M. Pic, on Anthicidae; Herr J. Faust, on Curculionidae; Dr. E. Gestro, on Coleoptera; Signor F. Silvestri, on Chilopoda and Diplopoda. In vol. xxxvi., the voyage of Leonardo Fea in Burma still continues to result in important contributions to science by the following papers: *Colydiides* and *Monotomides* (beetles), by M. A. Grouville (French text); *Languriidae*, *Erotylidae*, and *Endomychidae* (beetles), by Mr. H. S. Gorham (English text); supplementary note upon the *Juloidea* (Myriapods), containing description of three new species, by Mr. R. J. Pocock, of the British Museum (English text); *Monommidae*, *Trixagidae*, and *Eucnemidae* (beetles), by M. Ed. Fleutiaux (French text); new *Termitophila* (beetles), and Termites, from India, by Herr E. Wasmann (German text), with plate. The collections made by Dr. Elio Modigliani in the Mentawei Islands and Sumatra are reported upon by Signor A. Perugia, who treats of the fishes; M. E. Candèze, who describes new species of *Elateridae* (beetles) (French text); Signor R. Gestro, who deals with *Hispidae* (beetles); M. C. Kerremans, who enumerates the *Buprestidae* (beetles) from Mentawei and Sumatra; Mr. M. Jacoby, who describes new genera and species of Phytophagous Coleoptera from Sumatra (in English); Signor D. Rosa, on the *Lumbricidae* (with plate). Signor Lamberto Loria's voyage in New Guinea produces further results in the following papers: "Birds from South East New Guinea," by Signor T. Salvadori; *Buprestidae* (beetles), by M. C. Kerremans (French text). The *Chilopoda* and *Diplopoda* (Myriapods) collected by G. Doria and O. Beccari during the voyage of the "Esploratore" to the Red Sea are enumerated by Signor F. Silvestri. Signor A. Perugia reports on the fishes collected by Captain Guiseppe Capurro in the Antilles. Signor T. Salvadori, catalogues the birds collected by Don Eugenio Ruspoli during his last voyage to the Somali and Gallas regions. An important monograph on the Diplopoda is commenced by Signor F. Silvestri, beginning with the systematic part, covering 132 pages. Signor S. Traverso deals with volcanic and metamorphic rocks from Sumatra. M. Sommier contributes notes on the *Ranunculaceae* in herbarium of Signor Doria. Mr. G. A. Boulenger, of the British Museum, gives a list of the Reptiles and Batrachians collected by Dr. Ragazzi in Shoa and Eritrea (English text). M. Ed. Fleutiaux enumerates the Austro-Malayan Eucnemidae (beetles) of the Civic Museum of Genoa (French text). These two volumes, like so many of their predecessors, form truly monumental contributions to zoological science.

Annalen des K.K. Naturhistorischen Hofmuseums. (Vienna, vol. x., parts 3 and 4, 1895). The present double number completes the volume, and contains title and index, besides a general index for the first ten volumes under authors' names. The bulk of the part is taken up by a report on the collection of Meteorites in the Museum, with two appendices, the first by Professor José A. Y. Bonilla, Director of the Observatory of Zacatecas, on "The fall of Meteoric Iron at Mazapil"; the second by Dr. Aristides Brezina, on "The collection of Meteorites of the University of Tübingen," with two plates and forty figures in the text.

Annaes de Sciencias Naturaes (Oporto, July, 1896. Vol. iii., part 3). Mr. Edwin J. Johnston continues his "Floral Calendar," and Mr. W. C. Tait his article on the "Birds of Portugal," while further instalments of the "Catalogue of Hemiptera of Portugal" by Dr. de Oliveira, and of the "Mollusca and Brachiopoda" by the Editor, are both familiar features of this magazine. Dr. Lopes Vieira contributes the first instalment of a "Catalogue of the Reptiles and Amphibia of Portugal." An article by M. Ernesto Schmitz on the "Birds of Madeira" will be welcomed by ornithologists; it is divided into two parts, the first being a systematic list of the native birds, thirty-eight species being enumerated, and the second of migrants, in which 104 species appear; in the former the locality is given for each species. M. Machado contributes an article on the "Winds and Sea Currents along part of the Portuguese Coast immediately north of the Rio Douro." From an obituary note we learn that the distinguished Eugenio Schmitz, Engineer to the School of Mines, Paris, died on May 23rd, at S. Pedro da Cova, at the age of eighty-one. French by birth, he resided during sixty-six years in Portugal, where he diligently prosecuted the study of natural history. He made many contributions to science, chiefly on fossil-plants of the coal-measures and on the vascular cryptogams of the north of Portugal.

Botany Bulletin (Department of Agriculture, Brisbane, No. xiii., 1896). "Contributions to the Queensland Flora," by F. M. Bailey, F.L.S. Several new species of plants are described, and notes on miscellaneous subjects are added. The bulk of this Bulletin, however, is taken up by a descriptive Paper on the "Chemistry and Economic Properties of a number of Queensland Gums and Resins," by Dr. Joseph Lauterer. Four plates accompany this number.


CONDUCTED BY FRANK C. DENNETT.

| | Sept. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 9 | 5.28 a.m. | 6.26 p.m. | 11.13 | 5° 2′ N. |
| | 19 | 5.44 | 6.3 | 11.49 | 1° 11′ |
| | 29 | 6.0 | 5.41 | 12.25 | 2° 43′ S. |

| | | Rises. | Souths. | Sets. |
|---|---|---|---|---|
| *Moon* | 9 | 8.7 a.m. | 1.34 p.m. | 6.45 p.m. |
| | 19 | 5.14 p.m. | 10.30 | 2.45 a.m. |
| | 29 | 9.5 | 5.10 a.m. | 2.12 p.m. |

| | | Souths. h.m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 9 | 1.30 p.m. | 3″ 3 | 12.47 | 7° 17′ S. |
| | 19 | 1.23 | 3″ 9 | 13.18 | 11° 52′ |
| | 29 | 0.50 | 4″ 7 | 13.25 | 12° 52′ |
| *Venus* | 9 | 1.1 | 5″ 2 | 12.17 | 0° 38′ S. |
| | 19 | 1.7 | 5″ 3 | 13.2 | 5° 46′ |
| | 29 | 1.13 | 5″ 4 | 13.48 | 10° 41′ |
| *Mars* | 9 | 5.34 a.m. | 4″ 9 | 4.49 | 21° 31′ N. |
| | 19 | 5.15 | 5″ 2 | 5.9 | 22° 14′ |
| | 29 | 4.53 | 5″ 6 | 5.27 | 22° 47′ |
| *Jupiter* | 19 | 10.7 | 14″ 7 | 10.3 | 12° 49′ N. |
| *Saturn* | 19 | 2.59 | 7″ 3 | 14.55 | 14° 33′ S. |
| *Uranus* | 9 | 3.59 | 1″ 8 | 15.15 | 17° 50′ S. |
| *Neptune* | 9 | 6.3 | 1″ 2 | 5.18 | 21° 42′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Sept. 7 | 1.43 p.m. | *1st Qr.* | Sept. 14 | 4.10 a.m. |
| *Full* | „ 21 | 10.49 „ | *3rd Qr.* | „ 30 | 1.58 „ |

SUN.—The spots are small; on August 7th no spots, bright or dark, were seen on the disc. The mottling is, however, very beautiful at times.

MERCURY is at greatest eastern elongation, 26° 35′, on September 12th, but, notwithstanding, is not well placed for observation.

MARS is daily improving its position and increasing in angular diameter, rising at 9.48 p.m. on 1st and 8.35 on 30th of month.

THE other planets are still too near the sun for successful observation.

METEORS should be looked for on September 1-2, 6-7, 11-13 and 25, specially during the first week.

BROOK'S COMET remains a very faint object, and it appears that its perihelion passage will not be made until about November 4th.

VARIABLE STARS.—During September the following are in good position :—

| | R.A. h.m. | N. Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| R. Andromedæ | 0.17 | 37° 51′ | 6·3 | < 12·5 | 404·0 days. |
| R. Aquarii | 23.37 | 16° 0′ | 6 | < 10·5 | 388·0 days. |
| R. Cassiopeæ* | 23.51 | 50° 39′ | 5·7 | < 12·5 | 430·0 days. |
| α „ | 0.33 | 55° 49′ | 2·2 | 2·8 | |
| β Pegasi | 22.57 | 27° 22′ | 2·2 | 2·7 | |

* A vividly red star.

It was in Cassiopea, about R.A. 0h. 20m., N. Dec. 63° 24′, where the brilliant new star of 1572 blazed out so vividly as to be visible in the noonday sky.

THE TOTAL ECLIPSE.—As these notes are being prepared, the news has come to hand of the failure of our friends in Norway, owing to the presence of a cloud which obscured the sun all the time of totality. It is earnestly to be hoped that the Russian observers in Siberia have fared better. We fear that our Astronomer Royal has also failed at Jesso, in Japan.

METEOR OF APRIL 12TH.—A most interesting letter has been received from Mr. W. F. Denning, of Bristol, respecting this splendid meteor. He writes: "The meteor seems to have been first seen at a height of 118 miles above Formby, Lancashire, and to have disappeared at a height of thirty-four miles above Doddington, Cambridgeshire. Length of path, 177 miles; velocity, nineteen miles per second. The meteor descended to the earth's surface at an angle of 31° from a radiant at about [R.A.] 50°, [Dec.] + 44° in Perseus.

THE NEXT SOLAR TOTAL ECLIPSE visible in the British Isles will be in 1954, June 30th, when an eclipse occurs, visible as a total eclipse at Unst, the most northerly of the Shetland Isles, totality lasting 2m. 20s. The next visible in England is in 1999, August 11th, when the line of totality strikes the earth's surface in the southern part of the Gulf of Mexico, crosses the Atlantic Ocean, traverses England from Padstow, in Cornwall, to Torquay, passing south of Ventnor, and finishes in the Bay of Bengal. Thus the late Professor C. Pritchard, of Oxford, was informed by the late Mr. J. Russell Hind, who for so many years superintended our "Nautical Almanac."

A LUNAR OBJECT.—In the Mare Crisium, the beautiful enclosed plain in the north-west quadrant, three craters, known as Picard, Pierce and Pierce A, are visible. To the west of Picard—the southern crater—is a brightish spot, which is a most interesting object, varying in size and brightness. Under certain illumination has been seen a shallow depression in the place of the spot, and one or two tiny craterlets have been noticed within its area. The variations in its appearance do not seem to tally wholly with the illumination. Sometimes it has almost seemed as if a sort of fog rose over the object and produced the appearance. It is undoubtedly a singular object.

THE ZODIACAL LIGHT.—Those of our readers who live in regions possessing clear open skies ought to look out for this singular object. On the 11th and 12th of February last, M. E. Antoniadi had a splendid view of it from Juvisy. The writer had good views of it in February, 1878, between 7.20 and 8 p.m., from the Town Quay at Southampton. During September and October, the time for observation is the early morning some time before sunrise. It appears as a faint cone of light about 12° broad at the base stretching along the line of the ecliptic to an altitude of say 50°, reminding one of the milky way. Of course it is observed with the naked eye.

LUNAR ECLIPSES.—Total eclipses of this class, with a clear sky, are most interesting phenomena. On more than one occasion the writer has noticed that whilst the interior of the cone of shadow presented a reddish or copper colour, the outer edge appeared blue, giving the effect of the edge being darker than the middle. These chromatic effects doubtless being due to the dispersion brought about by the earth's atmosphere. These were seen very markedly on August 23rd, 1877, and March 11th, 1895. Another peculiarity noticed is the change of the relative brightness of lunar objects during totality, some of the objects appearing abnormally bright, whilst Aristarchus, in the north-east quadrant, ordinarily the brightest object on the moon, can barely be identified.

# SCIENCE GOSSIP

We would draw our readers' attention to the first article in this number of Science-Gossip. It is specially written by a member of the party who are now trying to reach the North Pole by balloon. As we write, nothing certain has been heard of their adventure, which must necessarily cause their friends much anxiety.

The interest in Polar exploration has, during the past month, been greatly increased by the safe return of Dr. Nansen. Although he has not succeeded in reaching his goal, he brings home a mass of valuable scientific observations. He succeeded in considerably reducing the distance, which has already been reached, from the North Pole.

Mr. Jackson, of the Jackson-Harmsworth Polar Expedition, will make every effort to reduce Dr. Nansen's approach to the Pole. He is admirably equipped for the journey, and may possibly succeed in reaching the North Pole. He has now Dr. Nansen's experience to help his own judgment. It is now thought that there is no land in that region.

There seems after all to be a chance of some scientific observations having been made on the total eclipse of the sun this month. It is reported that Sir George Baden Powell's yacht, *Otaria*, is returning from Nova Zembla with the astronomers who accepted his invitation to make an expedition for observing the eclipse. It is said they had a clear sky and were most successful.

We have received the "Proceedings of the Liverpool Geological Society" for 1894-95, part 3, vol. vii. This part contains several articles of more than local interest. The members of the Association have taken advantage of some new railway cuttings to examine the more recent strata in their district.

Owens College, Manchester, has lost a member of its scientific staff who will be much missed, in Mr. Thomas Hick, B.A., B.Sc., Demonstrator in Botany. A self-taught man, he graduated at the London University. Always an indefatigable worker, although for months past he knew his disease must soon carry him off, he attended his duties at Owens College to within a fortnight of his death.

We, last month, omitted to mention the death of Mr. Henry James Slack, the author of the well-known book on "The Marvels of Pond Life," which occurred at Forest Row, Sussex, at the age of seventy-seven years. He was a well-known microscopist, but also took interest in other branches of science, especially astronomy. Mr. Slack was the originator of the winter science lectures, so popular on Sunday evenings in London, under the auspices of the National Sunday League, of which society he was for a time president. He was also a past-president of the Royal Microscopical Society.

A curious instance of the dispersal of mollusca by human agency is related in the "Jahresheft der Naturwissenschaftlichen Vereines des Trencséner Comitates," 1895-96, from which it appears that the Collector Fennichel sent to the museum in Budapest, a large number of shells of *Helix profuga*, a member of the circum-Mediterranean fauna, collected in the neighbourhood of Astrolobe Bay, New Guinea, where it must, of course, have been introduced at some time or other.

The Pharmaceutical Society has recently tried a test case under the Pharmacy Act of 1868, against a London taxidermist, for selling cyanide of potassium in killing-bottles, as used by entomologists. The court gave its decision in favour of the Society, and assessed the damages at £5, with costs. Naturalists will therefore in future be obliged to get their instruments of death from their chemists, as it is illegal for taxidermists or others not qualified to sell such poisons.

In connection with the Liverpool meeting of the British Association, from September 16th to 23rd, the local committee have arranged for a loan exhibition of objects, especially in view of illustrating the papers or demonstrations to be placed before the meeting. The collection will be displayed in the new museum, now nearly finished, for the Zoological Department of University College, Liverpool. Readers desiring to exhibit should write to Professor Herdman, University College, Liverpool.

Messrs. Frederick Warne and Co., of London, are issuing a new and important work upon "Favourite Flowers of Garden and Greenhouse." Although it is chiefly intended for horticulturists, with instructions for growing plants by Mr. William Watson, of Kew Gardens, Mr. Edward Step is to make the chief feature of the book interesting with popular scientific accounts of each plant. It is to be illustrated by 316 coloured plates by M. D. Bois, of Paris. It will appear in weekly shilling parts, each containing six coloured plates.

If the extraordinary death-rate from heat apoplexy which has during the past month afflicted New York is any criterion of the intensity of the temperature in that city, it must have been high indeed. We doubt if the heat was so much the cause of the affliction as the custom of the people constantly using ice and iced drinks. We hear of the British-Egyptian Army in the Soudan at the same period, working while the thermometer registered 130° F. in the shade, but not of any specially increased death-rate among the troops.

The "Canadian Entomologist" for August contains a sad instance of death whilst collecting rare insects. John B. Lembert for some time past had collected in the Yosemite Park, one of the magnificent public reserves in Western America. Living all alone in the wild mountains of those regions the years round, he was chiefly known by correspondence and the value of his captures. On April 19th last, a passing Indian found his murdered body in the solitary cabin where he dwelt. Pelf could not have tempted his murderer, for Lembert had neither money nor valuables. His death is a great loss to American entomology, for although a collector first, Lembert was a keen observer and recorder of the habits and life-history of insects. His age is supposed to have been fifty-six years, but he leaves no one to mourn for his loss.

# NOTES & QUERIES

WATERPROOF CEMENT.—I should be glad if any of your readers could tell me of a recipe for making a waterproof glue or cement. One soluble in dilute acids preferred.—*Alfred J. Johnson, Birmingham; August 7th*, 1896.

CUCKOO'S EGG IN PIED FLYCATCHER'S NEST.—A friend informs me he has recently seen the nest of the pied flycatcher with three eggs, amongst which was a cuckoo's egg. The extreme rarity of the former bird makes this a very interesting fact. —*E. Wheeler, Clifton; June 18th*, 1896.

DEATH'S-HEAD MOTH CATERPILLARS ABUNDANT. —Have any of your readers observed an unusual number of the larvæ of the death's-head hawk moth (*Acherontia atropos*) this year? It is no uncommon thing for two or three to be brought to me, but this year I have had fifteen, of which twelve were found in a small cottage garden, not a quarter of an acre in extent, and close to my own garden. The others were found in three different places at no great distance from here. Once I had thirteen in the course of one late summer, but never before so many as this year. Once only have I found a specimen of the perfect insect in my garden, but it was much worn and not worth preserving. — [*Rev.*] *H. M. Mapleton, Badgnorth Rectory, Somerset; August 17th*, 1896.

FOOD OF PLUSIA MONETA.—With reference to Mr. C. A. Briggs' note and query (*ante* p. 81) on *Plusia moneta* and its food plant; the fact that the larvæ of this new acquisition to our fauna will feed upon the ordinary garden larkspur (*Delphinium*), a plant very closly allied to monkshood (*Aconitum*), is perhaps not generally known. Monkshood is such a particularly all-round poisonous plant that it is to be found freely only in old-fashioned country gardens, so that when my larvæ this spring had eaten up the supply of monkshood taken at the time they were captured, they had to eat larkspur, of which I had a plentiful supply, or die. I found they took to it readily enough, and fed up easily and freely. Whilst, however, the larvæ that fed up chiefly on the monkshood pupated in a bright orange-coloured cocoon, those that for the most part ate larkspur made a dirty white cocoon. Possibly this difference may not be entirely due to the food-plant, but it appears probably so, to a large extent.—*Thos. Wm. Hall, Stanhope, The Crescent, Croydon.*

EFFECT OF FEAR ON BIRDS.—The article in SCIENCE-GOSSIP (*ante* p. 34) on the effect of fear upon herons, has recalled to my mind a similar incident with regard to swallows. A few years ago, at Cawthorne, in Yorkshire, I was playing with a youngster's iron hoop and sent the thing flying down a steep hill. The road took a sharp bend at the bottom of the hill, with the result that the hoop went with a loud noise against the stone wall. Two swallows were flying over the road at the time, and as the hoop struck the wall beneath them they dropped as if they had been shot. They fell into a bed of nettles, and though I was quite thirty yards away I found on walking up to the nettles they were still lying there, as though stunned. I picked up one of them in my hand, whilst the other flew away. The one I secured seemed in a dazed condition, and sat in my open hand for at least three minutes, when I threw it up in the air, rather expecting it to drop, but it flew away easily as it was uninjured in any way. I have never since seen a similar case, and was much interested in your correspondent's note.—*Thos. Midgley, Chadwick Museum, Bolton.*

CLEANING HARD-SET EGGS.—Having for years experienced great difficulty in dealing with birds'-eggs which I have taken hard-set, I have this year tried the following method which I have found most satisfactory, and which I think might prove useful to other collectors. Take a fine needle and prick a circle on the side of the egg, making the holes as near an even size and as small as possible. When the piece of shell within the circle is entirely separated, carefully remove it, and with a fine pin, bent as a hook, extract the contents of the egg. Thoroughly wash out the egg, dry it, and lightly stuff it with cotton wool. Apply a little liquid gum on the inner surface and edge of the removed piece of shell, and replace it carefully in its previous position. If this be done with extreme care and nicety, the line of the circle is barely perceptible. The size of the circle must be about one quarter of an inch in diameter, more or less according to the size of the egg. In making the holes it is best not to prick them too close to one another at first, but to go round a second or even a third time if necessary. Also it is helpful to draw a circle faintly with a pencil, and to put a cross line to show the exact position of the piece of shell when replacing it. I have lately prepared for my collection in this manner, four eggs of grasshopper warbler, one of red-legged partridge, and two of coots, all of which eggs had been extremely hard set, and it would have been quite impossible to have blown them in the ordinary way.—*E. W. Du Buisson, Hereford; August*, 1896.

DAPHNIA AND ROTIFERS.—Mr. Saml. Bolton writes me as follows: "Your note on red patches in small ponds has nothing to do with Daphnia or Rotifers (SCIENCE-GOSSIP, August, 1896), but are Tubifex, and most likely some of the blood-red worms with them. If you had plunged a fine net into the mud you would have landed thousands; you have to be quick or they withdraw under the mud, they will also retract if your shadow goes over them. Mr. Baird must also have been mistaken with the same thing. The Daphnia would be in the water, but you could not see them; but the sun shining on the Tubifex, they would show through the Entomostraca." Mr. Bolton is no doubt a much more experienced naturalist than I am, but he is clearly wrong in his explanation of the red patches, for I filled two or three bottles from the red patches and found them to consist of one dense mass of Emtomostraca. The bottle of water looked like red ink from the immense number of its small red occupants. Professor Carr, of the Nottingham University, an excellent observer, saw them as well as myself, and there could be no doubt in the matter. The problem I wish to have solved is why the Daphnia collect in such enormous numbers accompanied by parasitical rotifers? Is it for mutual protection against these parasites? I sent a retriever dog to swim through the mass, and even then the Daphnia did not "retract," as as Mr. Bolton says, but merely shifted their position.—*W. Warrand, Ormidale, Colintraive, Argyllshire; August 9th*, 1896.

## ZOOLOGY

Lepidoptera at Hastings.—On July 20th I saw a perfect specimen of the large tortoise-shell butterfly (*Vanessa polychloros*) evidently just out from pupa. It was at rest on a leaf, so afforded a good view, when it was at once seen not to be *V. urticæ*. On August 3rd I had a larva of the deathshead moth (*Acherontia atropos*) brought to me. It had been found in the centre of Hastings, in a garden, feeding on the common groundsel. Is not this a new food-plant for this species? Last autumn a friend of mine caught a specimen of *Catocala fraxina*, that had flown into their house in Hastings, and which I do not think has been hitherto recorded.—*H. W. Ford-Lindsay, The Shrubbery, Clive Vale, Hastings; August 3rd*, 1896.

Vipers in Damp Places.—When in search of sedge-warblers, as described below, it might also be interesting to mention that, in spite of the wet, we saw two vipers, which slipped into the water upon seeing us, and it is worth remarking that I have never been to these marshes without finding vipers, which shows their partiality for wet land is quite as great, and in my opinion the more so, as their love for the dry, sandy bank facing the south. I also discovered, suspended on a reed, a large cocoon which I took to be that of the drinker-moth (*Odonetis potatoria*), but from which, to my pleasure, a lappet moth (*Gastropacha quercifolia*) has since emerged.—*H. Mead Briggs*, 37, *Nunnery Fields, Canterbury; July 28th*, 1896.

Nesting of Sedge-warblers.—Some time ago I ventured to put forward a few short notes with reference to the nesting-sites of the sedge-warbler (*Acrocephalus phragmites*), and I then stated (Science-Gossip, vol. ii., p. 156) my own experience had clearly shown that this bird did at times undoubtedly suspend its nest in the reeds, or rather sedges, in a like manner to the cup-shaped cradle of the reed-warbler. Subsequently, my notes were agreeably confirmed by Mr. H. K. Swann (Science-Gossip, vol. ii., p. 249), but for many reasons I was unable to adduce further evidence of this habit, so much contradicted by many eminent ornithologists, until this year, when, through the kindness of Mr. Carrington and the courtesy of Mr. Stevens, General Manager of the South-Eastern Railway, I was able once more to visit an old and favourite locality on the South-Eastern Railway Company's land. Unfortunately rain considerably marred our pleasure and hampered our progress on the one and only day it was possible to go, and although, from the standpoint of myself and friend, the outing was more or less a dismal failure, we were able to find two more suspended nests of the sedge-warbler, one of which contained young birds which flew on our approach. The shape of this nest to a great extent has been more or less spoiled by the young birds and its rough-and-tumble journey, but by the aid of wires I have tried to restore it as much as possible. This nest was about two feet above the water, close to the edge of the dyke, and as the sedges were old and brittle it was impossible to cut them any length.—*H. Mead Briggs*, 37, *Nunnery Fields, Canterbury; July 28th*, 1896.

## BOTANY

Rare Fungus, Annularia lævis.—In the autumn of 1894, after the great heat of the preceding summer, I found several specimens of the fungus, *Annularia lævis*, a species and a genus not, as far as I know, hitherto recorded in this country; the plants were in two different localities, quite a mile distant. Drawings of these were sent, with others, to Mr. Murray at the South Kensington Museum.—*E. Wheeler, Clifton, Bristol; June 18th*, 1896.

Fruiting of Auracaria.—Referring to the remarks of Mr. Lett (*ante* p. 24) respecting the fruiting of *Auracaria* in Ireland, I do not think it was at all an uncommon occurrence here during the hot summer of 1894. When at Clevedon, Somerset, in the autumn of that year, there were several trees of this species which bore extremely fine cones. No doubt the development of fruit resulted from the abnormal heat of that year.—*E. Wheeler, Clifton, Bristol; June 18th*, 1896.

Abnormal Plants at Bolton.—Enclosed you will find a peculiarly-twisted stem of figwort. I do not know if this form is common, but we have come across two examples this season in this neighbourhood, also one with whorled leaves. Another peculiar sport is of the garlic. This was found near Chorley, about nine miles from here, by Mr. J. Ashton. There is an abnormal growth of a leaf from the calyx of the flower. The following double-headed varieties of flowers have also been found near here this season: dandelion, two or three examples of mayflower, plantain, treble-headed ox-eye daisy, also unusually deep red-coloured flowers of yarrow.—*Thos. Midgley, Chadwick Museum, Bolton, Lancashire; July*, 1896.

Bolton Botanical Society.—At the commencement of the present year a few botanical enthusiasts waited upon the Chairman of the Museum Committee at Bolton, in Lancashire, asking that a Botanical Society might be formed, having the privilege of holding its meetings fortnightly, on Monday evenings, in the Museum. Permission was granted, and the society formed under the title of "The Borough of Bolton Botanical Society," the annual subscription being only two shillings. Previously there had been many such societies in the town, but they have never had a suitable place of meeting. The new society has already over sixty members and numbers of enthusiastic workers. Our aim is to tabulate the flora of the district, and as several of the local landowners have granted the members free access to their estates, I doubt not that with a few seasons' working, this end will be achieved. I enclose you a card, and from this you will see that fortnightly rambles are held; the specimens collected on the Saturdays being brought down to the meeting, and explained and commented upon on the Monday following. This society cannot fail to encourage in the district a taste for natural science as well as botany.—*Thos. Midgley, Hon. Sec., Chadwick Museum, Bolton.*

# TRANSACTIONS

The South London Entomological and Natural History Society.—July 9th; Mr. C. G. Barrett, Vice-President, in the chair. Mr. R. Adkin exhibited a short bred series of *Dianthœcia nana* (*conspersa*), from larvæ taken in Hoy; they were all dark in colour, about midway between the Shetland and Scottish mainland forms; also a series of *D. capsincola*, from the same locality, showing no variation from the usual English form. Mr. Auld, series of varieties of *Abraxas grossulariata* bred this year; one specimen was said to be of a unique form, the basal half of each wing being curiously streaked, while the outer half was quite normal; on the hind wings the streaks were very irregular in length. Mr. Turner, series and life-histories of the following species of *Coleophora*: *C. lineolea* from Brockley and Lewisham, *C. albitarsella* from Lewisham, *C. palliatella* from Epping Forest, *C. laricella* and *C. fuscedinella* from Carlisle; the latter species showed the young curved cases, which are abandoned early, and new straight ones made; also living pupæ of *Gonopteryx rhamni* from Byfleet. Mr. Lucas, bred specimens and pupa-skins of the local dragonfly, *Erythromma naias*, from Byfleet. Mr. Perks, a specimen of the *Polyporus sulphureus* taken from an old willow. Mr. Enoch, a living specimen of the very rare male of *Prestwichia aquatica*, which, with the assistance of Messrs. Dennis and Scarfield, he had discovered in a pond in Epping Forest; it had only the merest rudiments of wings. He much doubted the statement that the species was parasitic on the eggs of dragonflies; the ovipositor seemed too strong and too long. He suggested that the ova were deposited in some aquatic larvæ.—July 23rd; Mr. T. W. Hall, F.E.S., Vice-President, in the chair. Mr. West (Streatham) exhibited specimens of *Catocala promissa* and *C. sponsa*, bred from larvæ taken during the Society's Field-meeting at Whitsuntide. Mr. R. Adkin, a bred series of a *Hypsipetes*, reared from larvæ taken in Orkney by Mr. McArthur. He was unable to say whether they were *H. trifasciata* or *H. ruberata*, although he was inclined to think they were referable to the latter species. He also exhibited a specimen of *Cœnonympha pamphilus*, with the row of ocelli on the underside very well developed. Mr. Dennis, a series of undersides of *Cupido minima*, taken at Horsley, showing a complete gradation in the number and development of the spots, and also one upper side well scaled with blue. Mr. Fremlin, specimens of *Polyommatus astrache* var. *salmacis*, from Castle Eden Dene. Mr. Mansbridge, varieties of *Abraxas grossulariata* bred from larvæ obtained at Horsforth. Out of 150 larvæ two or three per cent only showed a more than ordinary variation, compared with some fifteen per cent last year from the same locality. Two specimens were asymmetrical, and one was a nicely radiate form. Mr. West, (Greenwich) exhibited specimens of the hemipteron *Dicyphus epilobii* from Eltham. Mr. Moore, a specimen of the second brood of *Cyaniris argiolus*, taken on July 12th at Oxshott, and also a specimen of *Plebeius ægon* destitute of the row of fulvous blotches on the upper surface, and one having confluent spots on the underside. Mr. Robt. Adkin contributed a paper entitled "Notes and Observations made during the Society's Field Meeting at Chalfont Road, on July 18th, 1896."—August 13th; Mr. C. G. Barrett, F.E.S., in the chair. Mr. S. Stevens exhibited an unusually small specimen of *Papilio machaon*, having the black band on the hind wing very narrow. Mr. R. Adkin, a bred series of *Pachnobia hyperborea*, from pupæ taken at Rannoch. Mr. McArthur, a preserved larva of the same species, mounted on a twig of its food-plant (*Empetrum nigrum*) the crowberry, and gave interesting details as to its life-history.—*Hy. J. Turner* (*Hon. Report Sec.*)

North London Natural History Society.—June 25th; Mr. C. B. Smith, President, in the chair.—Insects, plants and photographs from North Wales were largely represented, including: Exhibits by Mr. C. Nicholson, *Calocampa vitusta*, *Emmelesia affinitata*, *Lithosia griseola*, *Emmelesia decolorata* and *Melanippe unangulata*, all from Pwllheli; also photographs of the Pwllheli district, in Wales; Mr. Battley, a piece of stone from North Wales with dendritic markings resembling moss, also specimens of *Carterocephalus palæmon*, *Acronycta ligustri*, *Cidaria silaceata*, etc., from Northamptonshire; Mr. R. W. Robbins, plants and insects from Wales, and larvæ of *Dianthœcia capsincola* and *D. carpophaga*, and imago of *Sesia myopæformis* from Clapton; Miss Simmons, specimens of *Bryonia dioica*, *Ononis arvensis* (rest harrow), *Silene cucubalus*, *Habenaria conopsea* (sweet-scented orchis), *Ophrys apifera* (bee orchis), and *Briza media*. Mr. L. J. Tremayne drew attention to the recent discussion in the Entomological Society of London on the question of over-collecting in the lepidoptera, which resulted in the formation of a committee to enquire into the matter, moved the following resolution, which was seconded by Miss Nicholson and carried: "That this society heartily approves of the action of the Entomological Society of London in appointing a committee to deal with the question of over-collecting in the lepidoptera, and will be pleased to support the society in any action they may think fit to take in the matter." Mr. C. B. Smith read a paper entitled, "Notes from North Wales," being a description of a holiday spent there last July by himself and Mr. R. W. Robbins. They had fixed their headquarters at Barmouth, and had thoroughly explored the surrounding district, ascending Snowdon and Cader Idris, and visiting all the places of interest in the neighbourhood.—July 11th; Mr. C. B. Smith, President, in the chair. Exhibits: Mr. C. Nicholson, two ova which he supposed were *Dianthœcia capsincola*. They were laid on the flower of Lychnis vespertina, the white campion, and were whitish when laid, but became brown as the flower withered. They were from Clapton. Mr. Prout rather queried their species, as he said that *D. capsincola* has a very long ovipositor, and one would expect the eggs to be more deeply inserted in the plant and not so conspicuous as these appeared to be. Mr. Nicholson also exhibited a cocoon of *Cossus ligniperda* from the Island Horse-shoe Point, near Spring Hill; also series of *Bombyx quercus* and *B. callunæ* from Cromer, North Wales, Yorkshire and Hampshire; also, a pair of *Raphidia ophiopsis* (the snake-fly), from Epping Forest, and a couple of leaves from a lime-tree growing in the grounds of Sir H. Bessemer, at Dulwich. The tree always produces abnormally large leaves. Those exhibited measured 10½ inches by 8 inches.

Mr. R. W. Robins subsequently suggested that these belonged to the American bass tree; Mr. Battley, flowers of the bee orchis (*Ophrys apifera*), from Reigate Hill; Mr. Quail, a box of micro-lepidoptera, including *Agrotea nemoralis* and *Pterophora tephradaelylus*, taken near Herne Bay. Mr. Simes said that Mr. A. C. Smith had been taking *Melitœa cinxia* in plenty, at Guernsey. Mr. Battley gave an account of a trip to Northamptonshire, at Whitsuntide, where he had taken *Cartero-cephalus palæmon*, and larvæ of *Thecla pruni*, *T. w-album*, *T. betulæ*, *Asteroscopus sphinx*, *Trichiura cratægi*, etc. He had also noticed some pure white flowers of the purple bugle (*Ajuga reptans*). Mr. Bacot read the following notes on the genus *Smerinthus*: "I have lately been assembling the species of *Smerinthus* in my garden at Clapton. On the 7th, I took four *S. tiliæ* between 8.50 and 9.25 p.m. With *S. populi* and *S. ocellatus*, I find it necessary to place the female on a bush, or to leave the cage open, when a male will usually be found *in copula* with the female next morning. The males of these species do not, so far as my experience goes, assemble till after midnight, probably just before dawn. I think I have at last hit upon a reasonable explanation of the eye-spots on the hind wings of *S. ocellatus*. If the moth is disturbed when resting, it raises its fore-wings and suddenly exposes the eyes. The effect is rather startling, and is probably effective in scaring any small bird that might interfere with it. In breeding *S. tiliæ*, I have found that though the larvæ up to about their third moult do very well on fresh young shoots of the lime, they require less succulent food after this moult, and thrive best on the smaller dark green, fleshy leaves from the top or upper branches of the tree." Mr. R. W. Robbins recorded one *Zonosoma annulata*, from Chattenden. Mr. Prout recorded *Acontia luctuosa*, *Scoria lineata*, and the larvæ of *Saturnia pavonia* on oak, from the same district. Mr. Prout also recorded eight *Setina irrorella*, seven *Acidalia ornata*, *Anaitis plagiata* in great abundance amongst the St. John's wort, but very worn, and *Philabapteryx vitalbata*, from Boxhill, taken on July 9th. Mr. Jennings said he had been working up the local lists of Diptera and Hymenoptera, and reported progress. To the Diptera he had added twenty-three species, and had also met with one or two insects which occurred rarely last year, notably *Mintho præceps* and *Mersdon equestris*. In the Aculeate Hymenoptera he had added several new bees, amongst them *Melecta armata*, one of the parasitic bees, which he took from the burrows of *Anthophora filipes* in Epping Forest in April. In the Tenthredinidæ, Ichneumonidæ, and allied families of Phytophagous Hymenoptera, a few new species had occurred, but our list at present was a very short one. On Saturday, July 11th, the Society made an excursion to Leigh. The party travelled by the 3.8 train from Fenchurch Street to Benfleet, and proceeded to Candy Island, having heard that this was now the best locality for *Hesperia lineola*. The coveted insect, however, was not found during the afternoon, and entomology was almost a perfect blank. Messrs. C. S. Nicholson and L. J. Tremayne found a few plants, including *Vicia tetrasperma*, *Lepidium ruderale* and *Torilis nodosa*. The members enjoyed a very good tea at an inn by the river, and subsequently returned home by a late train. Other members of the Society were in another part of Candy Island during the afternoon, and took *H. lineola* in some numbers.—*Lawrence J. Tremayne, Hon. Sec.*

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* sh-uld be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6s. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

British Birds' Eggs.—For exchange, common, kittiwake and other gulls, R. T. divers, R. N. phalarope, eiders, five species terns, guillemots (choice and common), cormorants, rock-pipits, nightjars and others; also bird-skins and well-stuffed specimens. Wanted, other British clutches of eggs.—E. G. Potter, 19, Price Street, York.

Duplicates.—A large number of New Forest Lepidoptera and Coleoptera; desiderata, northern species and foreign stamps.—A. Ford, Fernleigh, Rugby Road, Brighton.

Land Mollusca, Lepidoptera, Coleoptera, and other orders of insects to exchange for exotic Lepidoptera.—W. G. Clements, Linden Cottage, Frindsbury, Rochester.

Offered, Tasmanian shells, correctly named, land and marine, principally the latter, about 200 species. Wanted, British and foreign shells not in my collection, lists first.—W. L. May, Sandford, Tasmania.

For Exchange.—Foreign land shells (Maltese and Sicilian), unmounted Foraminifera, excellent Miocene fossils, named, fossil sharks' teeth (seven families), Mediterranean marine shells, ostrich eggs, mounted diatoms by Tempère, micro-sections of fossil woods, geological photographs. Wanted, microscope lamp, cabinet, polariscope, geological books, works on the Foraminifera and Mollusca.—J. H. Cooke, 123, Monk's Road, Lincoln.

Offered, contents of 21-drawer cabinet of minerals and of 14-drawer cabinet of foreign shells. Wanted, minerals, volcanic rock, or an astronomical telescope.—T. Stock, 16, Glen Park, Eastville, Bristol.

Thomson and Tait's Treatise, "Natural Philosophy," De Morgan's "Differential and Integral Calculus," Lagrange's "Mécanique Analytique," cost £3 10s.; exchange whole or part for microscopic apparatus.—Blacklock, 19, Bruntsfield Avenue, Edinburgh.

Vertigo substriata, V. alpestris, H. pygmœa, P. anglica, Hyalinia nitidula var. Helmii, Azeca tridens var. crystallina and others, for H. aspersa var. unicolor, L. oblonga, L. involuta, Vertigoes.—A. Hartley, 14, Croft Street, Idle, Yorkshire.

Wanted, avanturine felspar, avanturine quartz, sard, fortification agate, brecciated agate, prase chrysoberyl, aquamarine, tourmaline, diopside; good minerals or fossils given in exchange for any one of the above; lists exchanged.—P. J. Roberts, 11, Ash Street, Bacup.

Wanted, amateur photographs of the sea, studies of waves and breakers; value given.—C. Dyer, 12, Stockwell Park Road, Clapham Road, S.W.

Wanted, to exchange the rhyolites of County Antrim for ceratites and other fossils.—R. Ball, 16, Charleville, Belfast.

Wanted, specimens of rare and uncommon fruits with foliage attached, Monstera deliciosa, Berberis dulcis, Eugenia ugni, guavas, musas, etc.; cash, state price.—David Sydney Fish, 12, Fettes Row, Edinburgh.

# ABNORMAL HAWKBIT.

By P. Taylor.

THE plant shown in the accompanying photographs is the common hawkbit (*Leontodon hispidus*), and was found by myself growing at the foot of the cliff between Lavernock Point and Swanbridge (about three miles from Penarth), in South Wales, on August 3rd, 1896. It is about twenty-eight inches in height above ground, and consists of a fasciated mass, somewhat fan-shaped, varying in thickness from about a quarter of an inch at the top, to half an inch or more at the root, the breadth along the top edge being fifteen inches. The "fan" is clothed with a number of leaves, those at the top being much smaller and of a different shape to those growing lower down. The flowers grow directly from the "fan," and, with a few exceptions, without any stalk. The top edge of the "fan" is covered with some hundreds of the stalkless flower-buds. Those flowers which have stalks may be seen in the photographs near the two upper corners of the "fan." A few inches from the root there branches off a separate flat stem, about a quarter of an inch thick and one and a-quarter inches wide, which has curved over upon itself in a spiral of two complete turns, very much in the same manner as the ash branch figured on page 6 of vol. ii., Science-Gossip (March, 1895). The formation of this spiral stem cannot be seen in the photographs, as it is hidden by the leaves growing from it, but the position is indicated by the projection on the right-hand side of the photograph marked *a*. There were also several flower-buds with the usual stalks growing from the spiral stem.

*a*

Fasciated Hawkbit, showing the two sides.

*47, Stanwell Road, Penarth; August 13th, 1896.*

# EROSION IN EXTRA-MARINE MOLLUSCA.

By Arthur E. Boycott.

Some years ago I collected some 1,100 or 1,200 *Unio pictorum* and *Anodonta cygnaea* in some ponds in Kent. The ponds were apparently a series of old marl pits, and in them these two species occurred in great profusion, so much so that after a successful day's work in the water, sacks were necessary to take home the spoil. Variation in the long series thus procured was not unnaturally frequent, but at present I desire to draw attention to a certain form of erosion which I noticed in the specimens from this locality. Both *Unio* and *Anodonta* were a good deal eroded, but not excessively so, and in some of the ponds *Bithinia tentaculata* (1) and *B. leachii* also occurred, much eroded and decollated, the decollation here being, of course, only a special form of erosion. Besides the usual absence of periostracum round the umbones, many specimens, especially of *U. pictorum*, exhibited a curious kind of erosion elsewhere on the shell, very commonly near the ventral border. It consists of comparatively deep and narrow pits and grooves, the latter running approximately parallel with the lines of growth. Now this pit erosion in not very rare, but the noticeable point about it is that in almost all cases a very nearly similar erosion was present on both valves. Whatever was the cause of the malformation, the mollusc seems to have had a strong desire to make its shell as nearly bilaterally symmetrical as possible. The shells mostly occurred at the time of collecting (September), with their anterior two-thirds buried in the mud, and of course the cause of the similarity of the erosion on the two valves may have been the fact that the two sides were almost precisely equally exposed to or protected from the mud or water. I may mention that the pits and grooves occur both at the anterior and posterior ends, if anything more frequently at the latter. Since first noticing this symmetrical erosion, I have come across several similar cases. For instance, I have a specimen of *Sphaerium corneum* on a caddis-case, which was evidently put under contribution when alive, as the valve, which is stuck on to the case, is strongly and distinctly indented at the point of attachment; this indentation is reproduced on the free valve. Again, in examining a number of young *A. cygnaea*, I found that many cases of slight malformations from injuries had been reproduced, so that both valves were very similar in appearance. It is easy to imagine how the edge of the mantle on both sides might be injured simultaneously, *e.g.*, by a fish biting at the shell, but it is not very clear how these young *Anodonta* could have been injured at all in this way. They occurred in the soft mud at the bottom of a large artificial tank, where there were a few pike and perch, and numbers of roach, but I noticed that the shells crawled about nearly under the surface of the mud, the young ones going especially deep. At any rate, the symmetry of the injury, however caused, was very apparent in many cases. It is noticeable, in passing, that though the mud at the bottom was rather foul, yet the shells of both *A. cygnaea* and *U. pictorum* and *tumidus* there occurring were remarkably clean and bright, owing, no doubt, to the fact that the water is always fresh and clean.

The same kind of symmetry is often observable in the erosion round the umbones of *Unionidae*, but it is, as a rule, I think, much less exact than in many of the pit and groove cases. Where the ordinary patch erosion runs very deep I have not, as a rule, noticed much correspondence between the valves. Near Hereford, on the Wye, I once took some *Margaritana margaritifera*, in which the erosion had apparently gone right through the shell. Sand had entered the hole, but it had soon been skinned over by the animal, and eventually a hard lump—often of considerable size—of agglutinated sand was formed within the shell. I have not seen a specimen in which this erosion had gone right through both valves.

I find that J. W. Taylor (2) has figured a very good case of symmetrical injury in *A. cygnaea*, which he attributes to some severe injury of the mantle. As in most cases of shell-distortion which are approximately symmetrical, one side is worse than the other.

The explanation of the causes of erosion in fresh-water shells seems almost as far distant as ever. That is to say, authorities do not seem to agree as to the reason, or reasons, for the initial loss of the periostracum. That $CO_2$ in solution, as it is in almost every water, will dissolve away the $CaCO_3$ of the shell seems certain enough, but the loss of the organic covering of the shell cannot, apparently, be due to the same cause. The explanations to account for the wearing of the periostracum are very numerous: some say it is caused by the boring of microscopic fungi (3), and it has often been stated that other snails eat away

(1) I may add that in these extensively eroded *B. tentaculata* the following points struck me: the shells were thicker, and the opercula were thicker, more concave, with stronger striæ, and appeared larger in comparison with the mouth of the shell.

(2) Monograph i. (1895), p. 103, fig. 216.

(3) On this subject see E. Bornet and C. Flahault, Bull. Soc. Bot. de France, xxxvi. (1890), pp. 147-176; Abstract in "Nature," xliii., p. 185.

the shells of their companions; in fact, Shuttleworth goes so far as to say that he can recognize the marks of the teeth of *Neritina fluviatilis* on other shells, and Sowerby held that some acid was developed from fermenting vegetable matter (1). G. W. Shrubsole has shown that out of four waters examined three, which contained from 0·53 to 4·00 grains of lime per gallon, acted strongly on shells, while the other one, which contained 8·33 grains, had no action (2). But it does not appear whether all the other constituents of these waters were estimated, and four cases are not very many to found an observation of this kind on. Something of the same kind has been suggested by S. P. Woodward (3), who says: "All fresh waters are more or less saturated with carbonic-acid gas. . . . But in the absence of lime to neutralise the acid, the water acts on the shells." This is of course no explanation of the loss of periostracum, At first sight the electrolytic process consequent on imperfect homogeneity of the shell, suggested to J. G. Jeffreys (4) by W. R. Grove, is an attractive idea; but the action should be stronger in the sea than in fresh water, whereas, as a fact, erosion is much more common among extra-marine forms.

It seems rather hard to understand how the "eggs of *N. fluviatilis*" (7) or $H_2S$ could possibly destroy any part of the shell's periostracum. It seems to me that the initial cause of erosion (in most cases at any rate) is not to be looked for in such agencies; I believe it to be a natural consequence of a state which might be termed one of "general ill-health," and the following case illustrates the point. In April, 1893, a single large *Limnaea peregra* was brought from some ponds close by and placed in a small fountain-basin, about eight feet in diameter by two feet or so deep. The descendants of this specimen bred and flourished exceedingly for some time. In the autumn of last year (1895), however, I noticed one specimen which was very slightly eroded. In February, 1896, some dozen specimens, apparently in good health and uneroded, were placed in a small jar aquarium in the house, where they seemed to do well at first. In April, I noticed (they had not been under constant observation) that some had died, while all that were left were infected, to an extraordinary degree, with *Chaetogaster*, and all were considerably eroded. On examining the fountain, many dead shells appeared, and nearly every specimen was more or less eroded and infected with the parasitic worm. The remainder of the specimens in the jar died by the middle of May, after having been obviously ill. At the present time (August) there are very few live *peregra* in the fountain, where before this summer they were exceedingly abundant.

This was the first batch of eroded *peregra* I have come across, and the association of *Chaetogaster* with them was very striking.

How far *Chaetogaster* is injuriously parasitic on snails I do not quite know. P. J. Van Beneden (5) says it lives "at the expense of" mollusca; F. E. Beddard says that *C. limnaei* of Von Baer (= *C. diaphanus*, Oersted) "lives parasitically upon fresh-water mollusca, and sometimes within their bodies" (6). It does not, however, appear that, as a rule, the worm actually feeds—at any rate entirely—on the snails. I have frequently noticed vegetable remains in their gut, and once a specimen of *Pediastrum* (?). But at the same time it would appear very probable that they are in some way injurious to their hosts. It is possible, of course, that the small volume of water in which the *peregra* were placed acted injuriously, but other specimens had been living more than a year in a precisely similar aquarium without showing obvious signs of ill-health. In another similar jar some specimens of *Planorbis complanatus* were placed, and, about the same time, developed a pit erosion (7), and eventually most of them died. Here again I think erosion was consequent on ill-health, how caused I do not know. I failed to find *Chaetogaster*, but, on the whole, *Planorbis* seems to bear a small volume and bad conditions much worse than *Limnaea*.

I have somewhere seen it strenuously denied that there is any "organic connection" between the snail and the periostracum of its shell. But it appears probable that such a connection, weak it is true, may exist. When a snail dies, the periostracum soon goes if it is exposed to the weather. If there is no organic connection between the periostracum and the snail, why should this be so? And hence, the connection may be partially suspended in ill-health, as in the case of *L. peregra* above, and so removal of the periostracum and consequent erosion ensues. After the very severe frost early in 1895, I noticed that deperiostracization was comparatively common in living *Tachea* from an exposed railway embankment. In Lamellibranchiata, the umbones are nearly always—normally in fact—eroded. They are the oldest part of the shell, and in that part of the shell the connection with the living animal is soonest given up and weakest. Once, so to speak, the periostracum is dead, it is removed by natural processes of decay, and the calcareous substance is dissolved by the carbon dioxide in the water.

As a last example I may adduce the following:

(1) Gray's Turton, ed. 2 (1857), p. 46.

(2) Journ. of Conch., v., p. 66; Camb. Nat. Hist., iii. (1895), p. 276.

(3) Manual (1851), p. 41.

(4) Brit. Conch., i., pp. li.-liv.

(5) "Animal Parasites" (1876) p. 114.

(6) "Monograph of Oligochaeta" (1895) p. 306.

(7) A very similar case appears to be recorded in Journ. of Conch. v., pp. 66-7 (G. W. Shrubsole).

on June 26th I collected a few *Neritina fluviatilis* from a rather quickly-flowing ditch near Oxford, and placed them in a small still pond here; on August 2nd the only one I could find was very extensively, though superficially, eroded, all the spotted colouration being removed. The species is notoriously adverse to quite still water, and difficult to keep alive during confinement.

When a decalcified section of the shell of a bivalve (1) is examined, the appearance presented immediately beneath the two layers of periostracum is of a number of irregularly angulated tubes with very thin walls, lying perpendicular to the surface of the shell, and it looks as if each prism of $CaCO_3$ in the outer layer were encased in a thin envelope of organic matter. And there is nothing which makes it impossible that these slender net-works should not permeate the whole shell—despite the denser construction of the nacreous layer—and join the periostracum to the adductor muscle. Hence it will be seen how erosion may follow ill-health, and it is a matter of common observation that erosion often occurs in waters which are seriously contaminated with some impurity. At the same time I think that one other cause at least may act directly in removing the periostracum: the brilliant French researches referred to above have shown that various algæ bore through the periostracum and right into the calcareous part of the shell in many marine and freshwater mollusca; and the holes thus made may eventually lead to extensive erosion.

Finally, to turn for a short time to terrestrial species: one of the most interesting forms of erosion here found is that consisting of spiral bands or grooves. This phenomenon is often seen in *Tachea*, and is very frequently post-mortem in character. Mr. T. D. A. Cockerell (2) drew attention to it some time ago, and stated that similar results could be obtained by treating the shell with dilute hydrochloric acid. He failed to thus produce them in *Tachea nemoralis*, nor had he observed them in naturally-weathered shells of that species. They occur, however, in both *T. nemoralis* and *T. hortensis*. The bands arise, no doubt, from the fact that some spot in the secreting edge of the mantle, makes, so to speak, a periostracum of inferior quality, and that when the snail dies, the weathering action of the rain, etc., first removes this weak tract, which, from the nature of the case, follows a course "corresponding to the position of the bands on other shells." These spiral bands, due either to erosion or to some distortion (3), occur in many species (4).

The case of normally decollate species is very curious: *Bulimus decollatus* is, of course, the regular example. Some genera, too (*e.g.*, *Cylindrilla*), are normally decollate. A sort of parallel may perhaps be found in those freshwater species (*e.g.*, *Limnaea glabra*) which are so very frequently badly eroded. Here the conclusion is forced upon us that the phenomenon must be in some way hereditary, though how it took its first origin is not very clear. The explanation that the upper whorls become disused, vacated and then absorbed, seems to have much to recommend it: if this view is correct, the case is not exactly parallel with ordinary erosion. Mr. B. Tomlin (5) has recorded some very interesting observations on *Clausilia*: he notices that those species which live in old walls, etc., get the projecting parts of their shells weathered, eroded and decollated (*e.g.*, *C. rugosa*, *itala*, *parvula* and *plicata*), whilst such species as *C. rolphii*, which is essentially geophilous, and lives among dead leaves, etc., are never decollated. A similar principle might apply to many elongated forms.

*The Grange, Hereford; August 24th.* 1896.

(1) I have chiefly used *M. margaritifera*.

(2) "Zoologist" 1885, p. 114.

(3) Probably of the prismatic layer.

(4) A list is given by Mr. S. C. Cockerell in Journ. of Conch., iv., p. 374, to which other species might be added.

(5) Brit. Nat. i, pp. 227-229.

## DEATH'S-HEAD MOTHS.

As all the older lepidopterists know so well, nearly every year is celebrated for the exceptional occurrence of some particular butterfly or moth. This season seems likely to be known in England as a "death's-head" year, for we hear of its having been taken in exceptional numbers in the caterpillar state throughout England and Ireland. We regret that we cannot find space in this number for all the records which have been sent to us, but the following extract from a letter, dated September 15th, received from Mr. Herbert A. Hole, of Harbury, Harcourt Road, Newark, may be considered typical: "During the last six weeks, both the larvæ and pupæ of *Acherontia atropos* appear to have been exceptionally abundant in the town of Newark-on-Trent, and in one or two of the neighbouring villages. Unfortunately my business is such that it prohibits my making a personal search during the best hours of the day. Most of my workmen, however, have allotments, chiefly devoted to the culture of potatoes, and it is to their goodness, knowing I take an interest in entomology, that I am indebted for at least ten specimens of the chrysalis and caterpillars; several others have been brought to me for identification. Although for about seven years I have worked this immediate neighbourhood, I have never come across either the perfect insect or larva, This particular season it seems to be comparatively in abundance. Will anyone tell me in the next issue of your interesting paper if this is an unusual incident?"

Those persons who possess pupæ will do well to force them at once with artificial heat.

# LEAF VARIATION.

By J. A. Wheldon.

IN the August number of Science-Gossip, Mr. H. E. Griset, in an interesting and suggestive article, calls attention to the variation in the shape of the leaf lamina of plants. It is probable that the writer's deduction, that "excessive dampness favours the sub-division (or hinders the formation of the parenchyma) of the leaf-blade," may be correct in the case of *Ranunculus aquatilis*, and other plants which grow immersed in the water. In the species above-mentioned, I have observed the capillary leaves almost totally disappear, and only leaves of the floating palmate or partite kind be developed, when the water supply runs short in a dry season.

Many other partially submerged aquatic plants exhibit diminution, or even total suppression, of the parenchymatous portion of such leaves as grow beneath the surface of the water, *e.g.*, *Helosciadum inundatum*, *Œnanthe phellandrium*, *Œ. fluviatilis*, *Callitriche*, *Alisma natans*, *Sagittaria sagittifolia*, and several species of *Potamogeton*. In some of the above, the leaf is reduced to the modified petiole only.

Thus far I agree with Mr. Griset; but I do not find in my experience that mere dampness of soil or atmosphere, as distinguished from total submersion, tends to hinder the expansion of the parenchyma. Indeed, I should imagine that such a moist environment would rather encourage its expansion, and thus theoretically would lead one to expect that leaves growing under conditions of greatest moisture would exhibit the least tenuity of division. Take an example cited by the author of the article. The various species or sub-species of *Taraxacum* grow in a wide range of habitats. *T. palustre*, which usually inhabits the dampest places, has leaves exhibiting the greatest expansion of the blade; in the *T. densleonis* of the roadsides and fields they are more deeply cut, and the maximum amount of division is reached in *T. erythrospermum*,


Instances of Leaf Variation.
Figs. 1, 2, 3 and 4, dandelion leaves; figs. 5 and 6, saw-wort leaves (all two-thirds natural size).

which delights in the most arid situations. The same holds good in the case of the species of *Nasturtium*. In *N. sylvestre*, growing on the river bank, the leaves are often cut into narrow segments, but in *N. officinale* the leaf divisions are broader. Two forms of the latter plant occur, *siifolium*, which grows in damper places than *microphyllum*, having the leaf-segments much broader than those of its relative from drier situations.

The same difference is markedly displayed in the case of *Lathyrus macrorrhizus*, and its variety *tenuifolius*. Many of the damp-loving saxifrages develop broad slightly divided leaves, but *Saxifraga tridactylites*, with its narrowly-cut leaves luxuriates on dry banks and walls. Other instances too numerous to mention will occur to most botanists; at the same time, no doubt, exceptions occur in which the converse, as noticed by Mr. Griset, holds good. Perhaps the best method of demonstrating the effect of dryness and humidity would be to trace the vagaries of individuals of a single polymorphic species, such as *Taraxacum officinale* or *Capsella bursa-pastoris*, in various habitats; and if this was done, I venture to predict that *ceteris paribus*, those occupying the driest situations, would exhibit the least development of parenchyma. It is probable that other influences, such as the amount of light and shade, cold and heat, available plant food in the soil, and heredity, would have to be taken into account in any serious attempt to determine the true reason of the remarkably different shapes assumed by the leaves of individuals of certain species of plants.

The large, slightly pinnatifid leaf of *Taraxacum*, illustrated by fig. 1, is from a damp ditch, and was growing almost in the water; fig. 2 represents leaves gathered from the dry summit of the embankment of the same ditch; and the third sketch is the leaf of a dandelion found at the foot of an adjacent wall, which was sheltered from the rain on two sides. Fig. 4 represents one of the delicately divided leaves of *Taraxacum erythrospermum* from the dry, barren sand-dunes of the Lancashire coast. An example afforded by a different genus is a leaf of *Serratula tinctoria* (fig. 5), which was collected on the river bank at Aysgarth (North Yorks). Contrasted with it is the leaf of an interesting small form of the same species (fig. 6), of which I have excellent specimens, collected on the Freshwater Downs by the late Captain Steuart. Although in this one matter I cannot quite agree with Mr. Griset's observations, I must express my thanks to him for the pleasure I felt in the perusal of his very interesting bit of botanical "gossip." It opens up an enticing line of study, one that can be followed amongst the common weeds accessible to the botanist whose lot, like mine, is cast in the suburbs of a large city.

*H. M. Prison, Liverpool.*

## UNIO LITTORALIS IN PLEISTOCENE TIMES.

By A. S. Kennard.

IN considering the question of the former occurrence of any species, too much stress cannot be laid on the imperfection of the geological record. Fossiliferous Pleistocene deposits are extremely rare in this country. We have no such well-developed beds as we have of the Cretaceous or the Eocene. On the contrary, they are always fragmentary, small patches, which by chance have escaped the enormous denudation which we know has occurred in, geologically speaking, recent times. Even when this danger has been escaped, the enclosed fossils are very often in such a fragmentary condition that the true specific determination is a matter of doubt. Though of small extent and rarely of any thickness, yet there is every reason to believe that these beds indicate a vast elapse of time. The complete series are probably represented in the Crayford beds, which are no more than a hundred feet thick. To the Malacologist they are of great importance, as in them are found for the first time many species of British Mollusca, while several which were then abundant are now quite extinct with us, though occurring on the Continent.

*Unio littoralis*, Lamk., was first described as a British fossil by Mr. G. B. Sowerby, in 1838, from specimens in the collection of Professor J. Morris. There is apparently an error as to the exact locality from which these examples were obtained. In the list, the species is only noted as being found at Erith, but Grays is given against the figure. It certainly occurs in both places; but while it is abundant at Erith, it is extremely rare at Grays, so that in all probability the former is the correct locality. Since its first discovery it has been recorded from Crayford, Barnwell Abbey and Grantchester, near Cambridge, Clacton, Cropthorne, near Evesham, Westminster, Ilford, Brentford and near Walton-on-the-Naze. At Grays, as mentioned above, it is very rare. In 1882, Mrs. S. V. Wood, jun., noted that although *Unio tumidus*, Retz, swarmed at this locality, he could never find *U. littoralis*, Lamk.; though Sir Charles Lyell sent his father some specimens of it, which

he had found many years before. There are in the Natural History Museum, two single valves and a pair of united ones, and Mr. Spurrell has a few fragments, and so far as I can ascertain these are the only remains known. At Crayford, on the other hand, it is fairly common, examples with the valves united being frequently met with. The best examples come from the brick earth, though it occasionally is to be found in the sand; young examples are very scarce. At Grantchester and Barnwell Abbey it was also common. The shells are rather narrower and not so thick as the Crayford specimens. Cropthorne, near Worcester, is one of the localities given by S. V. Wood in "Crag Mollusca," on the authority of Mr. H. C. Strickland, and there are specimens from this place preserved in the Museum of the Geological Society. During the excavations for the foundations of the new Admiralty offices at Spring Gardens, Westminster, a fine section of pleistocene beds was exposed, from which Mr. W. J. Lewis Abbott, F.G.S., obtained thirty-one species of Mollusca, and amongst them was *Unio littoralis*. Unfortunately, the only perfect example was destroyed, but a dorsal margin was preserved sufficient for identification, and Mr. Abbott adds that the destroyed example was of the Crayford type. The only record for Ilford was by Professor W. Boyd Dawkins, in 1867. No examples are known, so in all probability it is a printer's error. The Brentford specimens were obtained by Mr. T. Belt from a spot near Avenue Road, Windmill Lane. Some of the examples had their valves united and are in the Natural History Museum. Clacton is another of S. V. Wood's localities, and here the species was very common. This section is, however, I believe, a thing of the past, the growth of the town having destroyed it. In the "Essex Naturalist" for 1894, is a list of Pleistocene Mollusca from Walton-on-the-Naze, and *Unio littoralis* is included. The examples in question were presented by the late Mr. John Brown, F.G.S., of Stanway, to the Chelmsford Museum, and on a printed slip it is stated that they were found "at a part of the Essex coast five miles southward of Walton-on-the-Naze." If for five we read ten the locality would be Clacton, and there can be no doubt that this is another error for which the printer is responsible, and that Clacton is the true locality. In the Geological Society's Museum is an example labelled "Stutton." This place is not to be confounded with Sutton, the well-known locality for coralline crag fossils. It is situate a few miles south-east of Ipswich, and was worked for many years by the late Mr. S. V. Wood, but he has never recorded this species. It is, of course, quite possible that the specimen is correctly marked, but it is better, perhaps, to mark it as doubtful.

To sum up, of the places quoted as producing *Unio littoralis* eight are correct, viz.: Erith, Crayford, Clacton, Brentford, Crapthorne, Westminster, Grays, Barnwell and Grantchester; one is doubtful, Stutton; and two are errors, Ilford and Walton-on-the-Naze. Occurring as it does in localities so widely apart, there can be no doubt that it was in Pleistocene times a common and a widely-distributed species in this country. At the present time, though extinct with us, it is found in nearly all the rivers of France, and has been recorded from Sicily, Spain, Morocco, Algeria, and the Euphrates.

*Benenden, Mackenzie Road, Beckenham.*

## IN QUEST OF THE ERNE.

By Robert Godfrey.

DURING a tour in Shetland last summer, I was exceedingly anxious to see the erne, or sea-eagle, in her native haunts, and, in my constant ramblings from place to place, ever made this bird one of my chief objects of enquiry. The natives appeared to be familiar with it as a spring migrant, and were generally able also to refer to one or more eyries reputed to be occupied by these birds. I was told of at least thirteen different eyries distributed amongst six islands, but, as a fair number of these were traditional, we may safely limit the number of existing eyries to six or seven. For several weeks I met with no success, being either prevented from reaching particular eyries at all, or finding those I did reach forsaken at the time of my visit.

One morning in July I set out to examine a line of cliffs asserted to contain an eyrie, and, as by this time my prospects were being dimmed by the continually decreasing extent of the country still untraversed, I searched this rocky shore with the mingled feelings of fear and hope more deeply emphasised than hitherto. Following the zigzag course of cliffs is a slow proceeding, but the only sure one of discovering a rare and local species. I relied on noise to frighten up the more wary tenants of the cliffs, and regularly hurled down stones as I advanced. The cliffs were irregular with stony and grassy patches upon them, and were tenanted chiefly by herring-gulls and a few lesser blackbacks, with the inevitable shags. Other rock-frequenting species, as hooded-crow,

raven and rockpipit, were sparingly distributed, and at the rock base and off shore black guillemots, oyster-catchers and a single eiderdrake were observed. Cliff succeeded cliff with jagged edge and sheer descent, but in vain did I shout or roll down stones. Shags were resting on small rocky borders, or a raven would be scared, but the eagerly sought-for erne appeared not. Before and above a cliff away ahead of me the herring-gulls were in wild commotion, and with ever-increasing din were hailing my approach to their home. Presently an apparent rock, revealed for a moment by the tide, drew my attention off shore, but not again appearing at the regular motion of the tide made me suspect its nature; it proved to be a large porpoise, but it did not at succeeding blows rise so prominently into notice. On reaching the colony of herring-gulls, I rested on the grassy summit of a headland to watch their actions. Like huge snowflakes, rising and falling and twisting in and out amongst one another's trackless paths, they heaved up and down, surging now this way now that, in front of the rocky precipice, and maintaining a ceaseless din not unpleasing to the ear, and suiting in its wild melody their terrible home.

My attention was presently arrested by the tameness of a twite on the edge of the cliff, and I suspected its nest was at hand. The little bird, so graceful in appearance, and so alert in action, would seize one of the tiny flowerets of the sea-pink in its bill, and, lowering it to the ground, hold it in its foot and extract the seeds one by one, allowing the scales to fall away. Presently she flew to an adjoining fence, hemming in the head-land, and then disappeared for a time. I turned to watch the gulls again, and saw the young birds running along the ledges, and one more advanced than the others attempting flight. As I lay still I heard the merry noise of young birds being fed close at hand, and was so guided to the twite's nest amongst the rocks just opposite the spot where I lay. But it was safe from my intrusion, placed on a shelf between two perpendicular slabs of rock, and sheltered behind a patch of silene. The five young birds were fully feathered, almost ready to fly, and they sat in a line, clamouring whilst their parent fed them. The old bird again resorted to the sea-pink, and took short flights from one jutting stone to another, but, instead of again feeding them, departed, to remain away during my stay, and the youngsters, after fidgeting on the edge, settled down in peace and quietness. On my departure, however, both twites were calling beside me.

A long detour was necessary round the next cliffs, which from their lack of life failed in interest. A few gulls were about, a shag and a black guillemot were seen, and rock pipits, as hitherto, were on the landward portion. The scenery, however, was made more impressive in the absence of anything to detract from it. Following this came a long point which might perhaps be passed without any loss, but it must not be omitted if we are to be able to say afterwards that we searched the shore carefully. The rocks in our immediate vicinity are not prepossessing, but as we move outwards a spot is reached where the grass-clad cliff sends forth a huge jutting boulder with a downward slope into the bank. This surely is the proper ground at last. I stand still on the crest a few moments, and clap my hands sharply several times, when from beneath my feet there issues at once a huge uncouth bird. It differed entirely from the picture I had before-hand formed, but it was the erne at last. From my position above her I am afforded a full view of her—stout white head, short white tail, brown body, black primaries—and as I watch her flying, with slow wide swoop of her mighty wings, I deem her a rough and rugged bird. She has left her home but a little way, when she is followed by a seagull, and another, and another. Her huge-ness now is apparent by contrast. With measured beat she flies back and forward in front of her home, unheeding the herring gulls that noisily swoop upon her in turn, and uttering her short cry several times. At length she comes landwards, sailing in for the cliffs, and as she passes in front of them her very ruggedness is beautiful. Deserted now by her screaming attendants, she flies along a gulley and disappears.

I varied my standpoint to judge of the eyrie as fairly as possible, but I could not see the contents. The ledge she had left was well adapted as a perch for such a bird, and behind the masses of seapink a nestling eagle might easily have been resting unseen in the depression. I lingered by the cliff-head in indescribable delight at having attained my long-desired object, and then rambled off to raise the bird a second time. I had mean-while, however, to be content with what I had seen of her, and a fortnight elapsed before I fell in with another erne.

46, *Cumberland Street, Edinburgh.*

Duck Killing Birds.—A neighbour of mine living at Broad Green, Liverpool, has a large number of fowls, together with a few ducks. The family have been wondering at finding dead birds, mostly sparrows, in or near the trough containing water for the fowls. The other day the mystery was solved. One of the inmates on looking through a window saw a young duck, about three-parts grown, come waddling down the path and when it got near enough to the group of unsuspecting birds, it seized one of them in its beak and de-liberately took it to the water-trough and held it under the water until it was dead.—*F. P. Marrat*, 13, *Nursery Lane, Broad Green, Liverpool.*

# STRUCTURAL FEATURES IN AMERICAN ROTIFERA.

By Dr. Alfred C. Stokes.

THE following notes refer exclusively to certain structural points which seem to have been overlooked by other observers who have not had these particular species in circumstances so favourable as those in which they have presented themselves to the writer.

### Brachionus bakeri, Ehr.

In this country we have two forms of this well-known rotiferon, neither of which can claim even the dignity of a variety, as they differ from the type only in size, a common occurrence with the Rotifera in general, which, in regard to dimensions as well as to other more important characters, are among the most variable of microscopic creatures. The British animal is described in size as follows, in comparison with the two American forms of the same species: British form—length, $\frac{1}{92}$ inch; width, $\frac{1}{135}$ inch. American form—length, $\frac{1}{85}$ inch; width, $\frac{1}{112}$ inch. American form—length, $\frac{1}{100}$ inch; width, $\frac{1}{120}$ inch.

*Brachionus bakeri*, Ehr.

I have had both the American representatives appear in great numbers in an aquarium, frequently finding the small and the large forms on the slide at the same time; but while these do not vary in structure, I have observed with them one or two features not described as occurring with the species as known in England and elsewhere in Europe.

Within the stomach, opposite the entrance of the œsophagus and apparently continuous with it, is an appendage previously undescribed and presumably not observed in any other rotiferon, except in certain American species (1). On ordinary occasions this organ appears to be a conspicuous membrane with a convex, free margin, the whole vibrating in horizontal undulations, and measuring about $\frac{1}{2000}$ inch in width. This apparently membrani-form appendage is perhaps more readily seen through the dorsal aspect and less easily through the ventral, but it is observable at all times, either actually or by its effects; even when the stomach is filled with food the undulations may be indistinctly noted. After the rotiferon has been starved for several hours (for from thirty to thirty-four in this instance), the membrani-form aspect of the organ disappears, and it then seems to be elongate-fusiform in general contour, and to be attached by its extreme right-hand apex to the internal wall of the stomach, its optical form then simulating that of a three-fold spiral, or a three-bladed screw-propeller. That there could be a rigid, screw-like organ attached as described, and actually rotating on its long axis, as this then appears to do, is of course impossible. Such an appendage would soon twist all vitality out of its ligament, and speedily set itself free, to be digested with the other contents of the viscus. All these interesting and not inelegant appearances are illusory. The undulating organ exists, but it is not a membrane. To solve the problem and leave no doubt in the observer's mind is no easy microscopical task, but I can recommend it to those that have access to *Brachionus bakeri* as one worth struggling with. I can venture to say that before positively deciding as to the character of the appendage, the observer will arrive at several decisions to reject them all, and that he will at the first trial retire from the field discomfited, for the rotiferon will have the better of the contest. As the organ often seems to be finely striated, one decision will be that it is a broad band of delicate flagella extending across the front of the stomach, in close proximity to the entrance of the œsophagus, and undulating there, the transverse folds thus produced by the apparently synchronous movements of the pendent flagella simulating a membrane, and producing those optical illusions which the appendage offers freely even to the most patient observer.

The organ is actually a tubular extension of the œsophagus, as may be seen, when, by great good fortune, the free extremity is lifted up so that the flattened lumen may be noted. It seems to be finely ciliated internally. The tube is homologous with that in the crop of *Floscularia* and in *Apsilus*, but it differs from these in being in constant and rapid motion.

(1) Ann. and Mag. Nat. Hist., July, 1896; Journ. Roy. Micr. Soc., June, 1896.

The species is said to be common and widely spread in England, but if any description of this tubular appendage within the stomach has been published, it has not come under my notice. It is easily possible, however, that the effects of the rather conspicuous undulations may have been mistaken for vigorous action of the stomachal cilia.

The *Brachionus* developed in so great abundance in a small aquarium during the January and February of 1896 that they became visible to the naked eye as a whitish mist, and could be collected by a pipette and transferred to a watch-glass until the water became milky with them. The males were abundantly produced, and many females were carrying male eggs.

### Copeus quinquelobatus (1).

The two lateral canals meet in the posterior regions of the ventrum, and unite to form a short, common duct opening into the central portion of the contractile vesicle, which is apparently double but really single, the two lobes contracting and expanding simultaneously. The stomach bears an undulating, tubular appendage similar to that within *Brachionus bakeri*, the only differences being the shorter length and the fewer lateral undulations. I entirely failed to note this tube in the first few specimens seen, and therefore failed to include it in my description of the rotiferon. The appendage may therefore be more readily overlooked, especially when the stomach is gorged with food, than I had supposed. The colour of the body varies from a pale yellow to a yellowish-red, or almost the tint of the blood in certain Oligochæta. The tail and foot seem to be always colourless.

The flabelliform flame-cells ("vibratile tags") are, in face view, marked by fine, radiating striæ. In side view the internal flickering movements are seen to be produced by a narrowly ovate membrane, attached by the attenuated extremity to one of the antero-lateral angles of the cell, whence it extends obliquely across the cavity, undulating toward that branch of the lateral canal of which the flame-cell is the termination. The membrane is permanently twisted into a loose spiral, and each margin is apparently thickened into a cord-like edge. It is these margins which produce the illusion of a double spiral as the undulations are longitudinally transmitted. In face view three semicircular cords are visible vibrating obliquely. When the flame-cell presents its frontal edge to the objective, it seems to show a slit-like fissure, widest centrally and narrowing towards each extremity; yet this cleft may be illusory, as the tip-tilting of the cell is momentary only, and is, therefore, speedily gone out of focus, while the object itself is exceedingly minute.

*(To be continued.)*

(1) Journ. Roy. Micr. Soc., June, 1896.

## THE VALUE OF VARIATION.

By John T. Carrington.

In the amusingly flippant style of the "Superior Scientist" (1), which unfortunately too often disfigures the pages of our otherwise respectable young contemporary, "Natural Science," is a short notice in the September number of that journal entitled "A Registry Office for Snails." This style reminds one of the pomposity of that equally superior person the Honourable Mrs. Pedant, the vicaress in a country parsonage, when patronising her husband's poorer parishioners. Our "Superior Scientist" refers to a recently-published label list, issued for the convenience of those who desire to investigate the range of variation in certain five-banded Helices occurring in Britain. The note is evidently penned by a "closet naturalist," who depends for his information on published or unpublished lists, and is not experienced in these variable animals in the flesh. As only a small percentage of our readers will have had opportunity of seeing his note, it may be well to set his remarks in review. He says:

"The meaningless record of variations, mis-called 'varieties,' seems to afford a kind of conchological small-beer to many collectors of shells. The bands on certain British shells are a source of never-failing delight to some; whilst all have one time or other had a turn at them. All appear equally ignorant of the fact that it has been fully done before by Sauveur (Ann.Soc.Mal.Belgique, ii.), who first drew up the scheme of the eighty-nine possible variations in five bands of *Helix hortensis* and *H. nemoralis*. The latest venture in the undertaking is a 'Label List' by the editor of Science-Gossip, Mr. J. T. Carrington, published at the cost of a penny, that should rejoice the heart of the zono-maniac. A page of introduction is followed by a list of named 'varieties' (save the mark!) of *Helix pomatia*, *H. nemoralis*, and *H. hortensis*. The last four pages, printed on one side only, are devoted to a repetition of the names of the last two species, accompanied in each case by one of the band formulæ.

"The worst of it is, that like the farmer with the claret, 'no one seems to get any forrarder,' and no systematic use seems to have been made of these tables. The only published account we know is that by Mr. A. Belt ('Report, Ealing Micro. and Nat. Hist. Soc,' 1892), who proved the existence of twenty-seven out of the eighty-nine possible variations. We have also seen an unpublished record of thirty-three for the two species.

"Nobody, unfortunately, has yet gone to the animal and endeavoured to show the origin and cause of these bands on the shell, and whether they have or have not any physiological bearing. The subject is being left to the variety mongers, whose goal must inevitably be a registry office for snails."

Before discussing this question further, I am sure the Editor of "Natural Science" will permit me to thank him for inserting the notice and the

(1) I use this objectionable word in the sense indicated for it by Dr. Albert Günther, F.R.S. (Science-Gossip, N.S., vol. i., p. 242).

opportunity it gives for making the following observations.

With regard to the number of band variations according to the formulæ which are above referred to as having already been observed, the writer mentions only thirty-three. Like "all" who "have at one time or another had a turn at them," I have often noticed these variations casually, but it has only been for the past three seasons that I have given anything like systematic attention to the variation of *H. nemoralis* and *H. hortensis*, especially in regard to the band variation and its cause. During that time I have personally found no less than fifty-three different variations of the band formulæ in those two species. So far, independently of a small quantity of unsorted material, not at hand as I write, which I believe contains one or two more, the numbers are forty-eight of *H. nemoralis* and twenty-six of *H. hortensis*, many forms being common to each species. These I hope to describe in these pages on another occasion, with notes on their relative abundance or scarcity in the localities where I have searched for them. I may here mention, however, to show how much more one species is prone to variation of the formulæ, that in bands only, not combinations of bands, I so far find *nemoralis* has twenty-two forms, and *hortensis* only eleven, all the latter also occurring in *nemoralis*. Of combinations of bands by suffusion and otherwise, I have found twenty-nine variations in *nemoralis*, and fifteen in *hortensis*. I have three forms in *hortensis* which have not been found by me in *nemoralis*. With regard to the relative amount of searching for each species, I have spent about an equal number of hours on each, and examined about equal numbers.

In reference to the last paragraph above quoted, I may say that as far as has been practicable in the centre of London, I have reared to maturity both species from very young specimens, though not actually from eggs, with some remarkable results. I find I can by change of food and other means alter the band formula of an individual, I think I may say, at will. By that I mean particular bands will suddenly disappear or appear during growth of the shell. These experiments are, however, at present too uncertain to describe without further experience. I believe that in the country, with proper conveniences, much is to be learned by actually breeding the varieties by pairing specimens which have been isolated from birth, up to the time of pairing. My opinion is confirmed by collecting: certain forms occur in certain localities each year and have only as yet been found by me in those localities, though I have worked many others.

My plan in studying variation as exhibited in these two and their allied species—than which there are few animals in this country giving a longer range of variation—is to find out as far as possible what does occur in a state of nature, and especially what does not occur. When we arrive at an approximation of the latter fact it will be necessary to enquire into the reason why such is the case. At present no one even seems to have given any sensible reason why these snail-shells have bands at all, better, perhaps, than—like the stripes on a tiger—to help to hide them in the grass. The first difficulty with the theory is, that when the animal is at rest or feeding, with few exceptions the natural position of the stripes on the shells is across the grass and not in the direction of its growth.

Sometimes I am asked, "Do you think it possible to get all the eighty-nine different band formulæ?" I can only reply that I think it is, when I have got so large a proportion myself, without outside aid, in three seasons, and without exchanging or gifts from others. My object in having this list printed, was, that I might send it round, for their local census, to the very few people in this country and on the Continent who collect these band forms, so as to try to get at some estimate of the missing forms. While so printing, it struck me that it might also be a label list; for nothing is more troublesome in this investigation than having to turn out unlabelled series of band forms for reference.

Nowhere do I claim to be the originator of the band formulæ, as seems to be suggested in the note above quoted. I was perfectly acquainted with the article by Sauveur in the "Annals of the Belgian Malacological Society" published in 1867. By the way, our would-be corrector does not seem to know that Sauveur's table quoted was not an original invention, but is an exact copy of one issued by Jules Colbeau, in December, 1859. The latter is apparently the first full table published setting forth the whole band formulæ of these species. Albin Gras, in 1840, had theoretically worked it out by mathematical methods, and gave sixty-five instances, doubtless knowing the rest. He identified the bands by the vowels *a*, *e*, *i*, *o*, *u*. G. von Martens, in 1832, appears to have been the first who originated a formula which enables the band variations to be described on paper. We therefore find our "Superior Scientist" as weak in his knowledge of the literature of the subject as of the animals themselves.

I have had the pleasure of examining Mr. Belt's list, and some others, but have not yet made an exhaustive search into such lists, in view of ascertaining what additional forms have been recorded.

With regard to the list of "varieties," I think I have "saved the mark!" with *H. nemoralis* and *H. hortensis*; for in the three seasons, I have found all of these with one or two exceptions, and many others, including some named by Mr. Cockerell, which

appear to me to be constant and good varieties. If the word "variety" means a constantly-repeated form deviating from a recognized type, and so has received a name for identification, I presume our "Superior Scientist" knows what he means by "saving the mark," for few other people seem to understand him.

I do not think it would become me to offer in these pages anything like an apology to the "Superior Scientists" for my small attempts to assist in unravelling such an intricate question as the cause of variation; nor for the "meaningless record of variations, mis-called 'varieties,'" which "afford a kind of small beer to many collectors." I would, however, venture to remind them that out of such small beer has been built up the great theory of evolution and constant development or deterioration of every living plant and animal. It was from such evidence as this that the late Charles Darwin founded his book on the "Origin of Species"; as evinced by his numerous references to such records. Could Mr. William Bateson have written his fine work on the "Materials for the Study of Variation" without reference to records of others? Some of them were doubtless thought "meaningless" at the time of publication by the "Superior Scientists," though when collated and discussed in conjunction with other records by a master in science like Mr. Bateson, these freaks assume a very different aspect. We have seen in our own life-time, and in this country, some types begin to vary, and continue to do so until the type we knew so well at first has become nearly lost, while the variety is now as common as our first-known type. I firmly believe that had Julius Cæsar had a skilled naturalist attached to his expedition when he invaded these islands, and that good Roman had remained to correctly describe our fauna, we should now puzzle over many of his descriptions. If such changes happen as we have ourselves seen to take place in our own short life-time, what might we not expect to have occurred in a couple of thousand years, during the progress from primeval forests to our present highly-cultivated and drained country. Our Roman naturalist would at the time have been accused of chronicling very small beer, but assuming his work to have been correct, its present value would have been inestimable.

The chief danger of such remarks as those by the "Superior Scientist," is that the covert sneer contained in them may deter young naturalists from pursuing lines of thought and investigation which are really unworked, and thus we get "no forrarder." When I first commenced to collect lepidoptera in 1857, and for nearly thirty years later, it was the custom of the "superior entomologist" to sneer at British butterflies and their collection. The effect was, for all that time we depended almost entirely on foreigners for descriptions of their larvæ, and there was not to my knowledge a single person in Britain investigating their life-histories, excepting Messrs. Hellins and Buckler, and then only for purposes of figuring the larvæ for a book. After Mr. Scudder's really scientific work appeared on some North American butterflies, I never failed, as editor of the "Entomologist" and privately, to point out our ignorance of our native species. It was I who urged Messrs. Hawes and Frohawk and others to take up the subject, with the result that a butterfly was added to our fauna, and there remains very few native species which have not been described and figured from the eggs, through all their stages, by English students, to whom the foreigners have now to turn.

What does our "Superior Scientist" desire? The extinction of the field-naturalist and the establishment of the "closet" micro-anatomist, whose first object appears to be to turn into a maniacal creator of new terminologies? If so, let him take to heart Mr. W. T. Thiselton Dyer's observations made last year at Ipswich, before the Botanical Section of the British Association. The fact is, there is ample room for both the field-naturalist and the scientific biologist, neither of whom can afford to sneer at the other. Had it not been for the large number of the public who took a dilettantic interest in "Natural History" as collectors, and the consequent pressure which after many years they indirectly brought to bear on public opinion, "the powers that be" of the Natural History Department of the British Museum might still have been housed in a basement in Bloomsbury, crying piteously for a new home at South Kensington. We could point to others, students of less popular sciences, who now bewail the absence of Government help simply because there is an absence of popular interest in their particular studies.

If our "Superior Scientist" will favour us with his views on these questions more fully, he will find a courteous welcome to our pages; and though I have had my tilt at him in return for his notice, he must understand I consider his remarks to be intended in all good nature.

## COLD AND HUNGER.

"COLD and hungry" is a much-used phrase, but its full meaning has perhaps never before been properly understood; for we now learn that cold of a certain intensity can produce hunger of an extremely healthy description. The well-known M. Raoul Pictet, of Switzerland, was making experiments on a degree of cold considerably lower than any which occurs naturally on the globe, and he found that at temperatures between 110 and 150 degrees below zero (Fahrenheit) no covering of any description such as is ordinarily

used for warmth would keep the cold out, or, more correctly, the warmth of the body in. The skin seems perfectly insensitive to the intense cold, so that one might be quite frozen to death without knowing it. This curious unconsciousness of the nervous system to a stimulus of an unusual kind can be easily paralleled in many other branches of physics; thus the extraordinary experiments of M. Nicola Tesla some few years ago, in which he passed a current of electricity of such intensity through his body that a hundredth part would in the usual way have been amply sufficient to kill him. This was, however, of an unusual kind, being what is known as a rapidly alternating current; that is to say, the direction of the current changes many thousand times in a second. To return to our freezing experiments. M. Pictet had a pit which was maintained at this extremely low temperature; he lowered himself into this, but naturally had an arrangement by which he could be quickly pulled out if necessary. After about four minutes he states that he experienced a most intense feeling of hunger, he then came out, waited for some little time, and subsequently repeated the treatment several times. After each occasion he satisfied his hunger, without experiencing any of the extremely unpleasant results which had always followed before, as he severely suffered from indigestion. It was only after some little time and several freezings that he felt himself to be cured of this unpleasant ailment, but now he states that he feels a new man. It is to be hoped that the medical profession in this country will seriously consider these results and see if many sufferers cannot be cured in this very simple and pleasant manner. H. H. F. HYNDMAN.

5, *Denning Road, Hampstead.*

## UTILITY OF NAMES.

I READ your article on the "Utility of English Names" in the July SCIENCE-GOSSIP (*ante* p. 41), with much interest and feelings of sympathy with your protest against the unfortunate muddle into which we are drifting with the scientific names for our plants and animals. Nomenclature is coming to such a pass, that it is useless any longer to obtain the technical magazines devoted to botany, entomology, or zoology generally; for one cannot follow the articles. They may be treating of some rarity or possibly only a common thing, for the identity is obscured by unfamiliar nomenclature. Even the reports of societies in SCIENCE-GOSSIP have become nearly as useless, for it is impossible to follow them for the same reason. I feel sure other persons, like myself, who have for many years taken an active interest in several branches of Natural History, will, in consequence, cease to take in the modern literature of the subjects. This is solely in consequence of what you rightly describe as a chaos of names being introduced, which render abortive the efforts of a lifetime to become acquainted with our plants and animals. Like myself, there must be many persons who could not, as you rightly point out, on account of other occupations, continually re-learn the multitude of changed names that appear in every new book and magazine one picks up.

I lately bought the last edition of the "London Catalogue of British plants," and in this is sad evidence of the misfortune of which we complain. In it well-known specific names are changed and genera classed under fresh orders. I looked for a plant which is fast becoming so plentiful as to positively choke some of the ditches in the Thames Valley, the well-known naturalised *Impatiens fulva.* To begin with, in the last "London Catalogue" there is no order Balsaminaceæ and no *Impatiens fulva;* but I find under the order Geraniaceæ, *I. biflora,* though there is nothing to indicate that it refers to the familiar *I. fulva.* In the same order is placed the genus *Oxalis,* which we had all learnt to honour as possessing its own order, Oxalidaceæ. Further instances can be readily given of a like character which renders this otherwise valuable list almost useless. The same remarks apply to other divisions of nature, until one becomes so discouraged as to feel like cutting the whole thing; as there seems to be no finality to the worry.

What I think is, that well-known and generally accepted names of any plants or animals should be continued until some recognized society or committee of European celebrity decides that the time has come for the publication of a new standard list of nomenclature of the subject. No such list should be issued unless it is synonymic with the alteration to be accepted, if any, in distinct type at the top of the list of synonyms.

If editors of scientific journals would make the rule of adhering to these recognized lists, and insisting on their contributors following them, or at least placing the name there accepted in brackets indicating any change from *the* list, the readers would be able to take their wonted interest in their pages, which pleasure is now denied to them. I have no desire to become so tenacious of my first-learned names as to deny the claims of others, if sanctioned by priority and more general agreement. What I do complain of is the absence of finality in their use by every irresponsible writer, who may, or may not, be mistaken in his opinions on nomenclature. Thus has arisen the chaotic muddle into which we have drifted. It will do an immensity of harm by disgusting many who might otherwise contribute items of knowledge of more than passing interest.

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*Primrose Club, Park Place, St. James', London.*

# ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Continued from page* 92.)

IN my last article, in speaking of *Corilla humberti*, I stated that only two specimens were known to me to exist in collections, and that these were in the possession of Dr. Brot, who described the shell. Since writing, however, Mr. Ponsonby has shown me a specimen, which, upon being opened, proved to pertain to that species, although it is considerably less rounded in outline. The palatal tooth corresponds in size and position to that in Dr. Brot's shells, but the parietal fold extends much further back, a fact which confirms my surmise that this fold in the shell figured by Dr. Brot (and by me, fig. 11, *ante* p. 92) had been damaged in the cutting process. Colonel Beddome has informed me that he possesses three specimens of this species, which he has obligingly sent to me for inspection; one of these agrees with Mr. Ponsonby's shell in being somewhat oblong, while the other two conform to Dr. Brot's types as regards outline. The species certainly appears to be less rare than was at first supposed, and it may turn up in other collections.

We have now dealt with *Corilla charpentieri*, *C. fryae*, *C. erronea*, *C. rivolii*, *C. odontophora*, and *C. humberti*. The only other species of the genus at present known, are *C. anax*, Benson, and *C. beddomeae*, Hanley.

The two species last named, with which we are here concerned, form a separate group in the genus, and, from considerations which will be explained further on, may be looked upon as being the oldest members of the group provided with plates, *Corilla charpentieri* being the primordial form. This group of *Corilla anax* (including *C. beddomeae*), is of equal value to the group of *Corilla erronea* (including *C. fryae*, *C. rivolii*, *C. odontophora* and *C. humberti*) and to the remaining group of *Corilla charpentieri*.

*Corilla anax* is shown in figs. 12*a–e*, the drawings having been made from a specimen in Mr. Ponsonby's collection. It is the only species of *Corilla* known to occur outside Ceylon, being found, as already stated, in the southern part of India. It is of a dark chocolate colour, and possesses three parietal and four palatal plates. Fig. 12*a* shows the entire shell, four of the plates, two parietal and two palatal, being visible from the aperture. The parietal plates are much broader than in the other species, No. 1 curves upwards, while No. 2 reaches as far as the parietal callus; but, unlike those of the other species, they are separate. No. 3 parietal plate is almost horizontal, with but a slight curve, as will be seen on reference to fig. 12*c*, the specimen being there figured with the outer wall removed. Fig. 12*d* shows the same shell with part of the outer wall broken away, and the plates are shown as they appear from behind their inner terminations. The palatal plates also are seen to be much broader than in the other species, and the three upper ones are much more oblique, resembling in this respect the immature plates found by me in three of the other species. In fig. 12*e* a portion of the last whorl is drawn, in which the palatal plates Nos. 1, 2 and 3 are shown as they appear through the shell, while fig. 12*b* shows the entire shell from below with palatal plates Nos. 3 and 4 shining through. Colonel Beddome has been so good as to lend me several adult examples of this species for examination, one of which is of interest from the fact that it exhibits, in addition to the mature armature, immature plates which are identical in form and position with those I found in an adult shell of *Corilla odontophora*, and described in my previous article (*ante* p. 92). With these adult examples was an immature shell with three whorls completed, which is specially noteworthy in that it possesses two sets of immature plates, one near the end of the third whorl, and the other a little beyond the place where two and a-half whorls have been completed. It may therefore safely be inferred that the plates are not absorbed till after completion of the new ones, and it will be remembered that this is not an isolated case, for, as already stated, two sets of plates were observed by me in a full-grown specimen of *Corilla odontophora*, and Colonel Beddome lent me a shell of this last-named species, identical in this respect. Colonel Beddome informs me that he collected his specimens of *Corilla anax* on

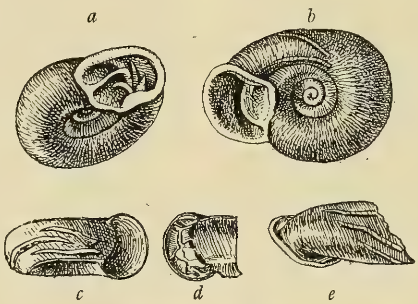



Fig. 12.—*Corilla anax*.

the Anamali Hills, in the Coimbatore District of South India, in moist woods, at 2,000 feet elevation, where it was very abundant on and under dead logs.

*Corilla beddomeae* (figs. 13 and 14*a*–*e*), is, I believe, somewhat rare in collections. Mr. Pilsbry has not included it in his synopsis of *Corilla* ("Manual of Conchology," ix., p. 147), but, guided probably by its external characters, he refers it to the genus *Plectopylis* (see Errata, Index, p. 121, of the same work). The absence of

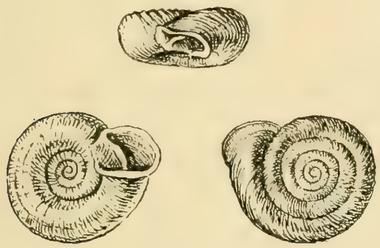


Fig. 13.—*Corilla beddomeae*, type.

vertical or transverse barriers on the parietal wall, however, amply warrants its inclusion in the present genus. The species differs in appearance from the others in being wrinkled, thinner in texture and much flattened above. Fig. 13 shows the type from Haycock Mountain, Ceylon, the specimen being in Colonel Beddome's collection. It will be noted that it is strongly and regularly wrinkled, the rugae being particularly coarse above and about the keel, gradually decreasing towards the base. The specimen measures twenty millimetres in diameter. In figs. 14*a*-*e* a small variety from Watawala, Ceylon, is shown from a specimen kindly lent by Mr. Ponsonby, who, with his usual courtesy,


Fig. 14.—*Corilla beddomeae*, small variety.

allowed me to open the shell, although it was his only specimen. It will be noticed that this variety is less coarsely wrinkled than the type; it is also paler and smaller, measuring only sixteen millimetres in diameter. Fig 14*e*, which shows the shell with the outer wall broken away, discloses the fact that only two parietal plates are present, corresponding to Nos. 2 and 3 in those species possessing three plates; for the sake of uniformity they will be numbered 2 and 3; both are visible from the aperture (see fig. 14*b*). No. 2 reaches to the parietal callus, and, as will be observed, it is long and irregularly flexuous, while No. 3 is very short. Of the four palatal plates Nos. 1 and 2 only are visible from the aperture. Nos. 1, 2 and 3, are broad, and ascend obliquely, parallel to each other, while No. 4 is smaller, narrower, and revolves horizontally, parallel to the suture, as may be seen on reference to fig. 14*c*, which shows plates Nos. 1, 2 and 3 shining through, and fig. 14*d*, which shows Nos. 2, 3 and 4. Fig. 14*a* shows all six plates from behind their inner terminations.

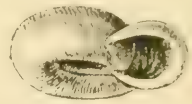


Fig. 15.—*Corilla charpentieri*, var. *hinidunensis*.

Colonel Beddome has also favoured me with the loan of specimens of a shell sent out by Mr. H. Nevill, under the name of *Corilla hinidunensis*, and published by him without description in "Enumeratio Heliceorum et Pneumonopomorum insulae Ceylon adhuc detectorum" (1871), p. 1. Mr. Pilsbry, in figuring this form in the ninth volume of the "Manual of Conchology," p. 148, t. 41, ff. 23–25, has, with his usual discrimination, reduced it to a variety of *Corilla charpentieri*, Pfeiffer, and a careful comparison of the two forms has convinced me that this view is the correct one, as the only difference which could be detected is that of size, *Corilla charpentieri* measuring twenty-nine millimetres, and Nevill's *Corilla hinidunensis* twenty-two millimetres. To complete the series I have thought it useful to add a figure of

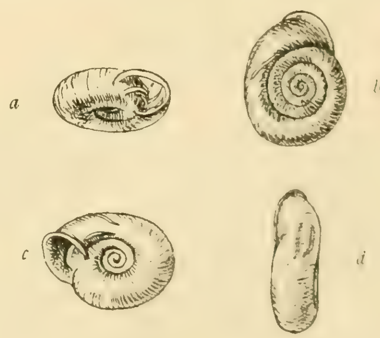



Fig. 16.—*Corilla erronea*, var. *erronella*.

this shell (fig. 15), which must now be known as *Corilla charpentieri*, var. *hinidunensis*.

Since dealing with the group of *Corilla erronea*, Colonel Beddome has communicated to me another form, known only by the unique specimen which he received under the manuscript name of *Helix erronella*, Nevill (Ceylon). As manuscript names are a source of great trouble, I am pleased to have the opportunity of studying and figuring

this form (figs. 16 *a–d*). On comparing it with *Corilla erronea*, it is at once noticeable that it has great affinity with that species; it is, in all probability, only a well-marked variety of it, and as it is known only from the single specimen it would certainly be imprudent to accord it higher than varietal rank. It possesses the same number of plates, but the shell is much smaller and thinner, and the palatal plates are much shorter and placed much nearer the mouth of the shell. The outer terminations of the parietal plates and the whole of the three upper palatal plates are visible from the aperture (see fig. 16*a*); palatal plate No. 3, which in *Corilla erronea* is nearly horizontal, is here strongly oblique and ascending, while No. 4 reaches nearly to the peristome (see fig. 16*c*). The form must be known provisionally as *Corilla erronea*, var. *erronella*.

All the known forms of *Corilla* fall naturally into

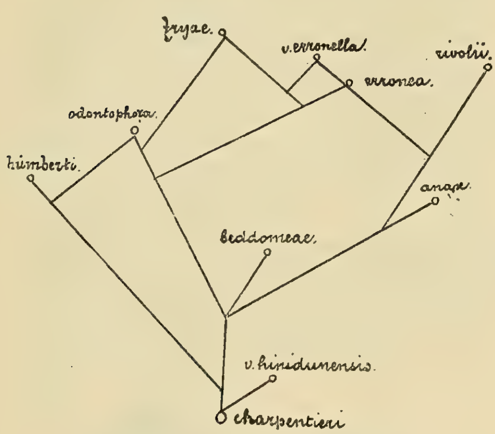



DIAGRAM OF RELATIONSHIP OF CORILLA.

the three groups of *C. charpentieri*, *C. anax* and *C. erronea*, already indicated. The first group, that of *Corilla charpentieri* (including the var. *hinidunensis*), is without internal plates; the second, that of *Corilla anax* (including the two forms of *C. beddomeae)*, has oblique palatal plates; and the third, that of *Corilla erronea* (including the rest of the genus), has horizontal palatal plates. It will be remembered that the structure of the armature in young shells differs in a remarkable degree from that found in full-grown specimens. I have pointed out that in the former case the plates are invariably broad and obliquely slanting upwards (see *ante* pp. 90 and 91), while in the latter case they are, in some species at least, narrow and horizontal. From what we know of the retention of ancestral characters in young individuals, as explained by Mr. Darwin ("Origin of Species," sixth edition, p. 388), it may safely be assumed that the immature form of plates found in the young shells represents the form of plates which were possessed by the progenitors from which the existing armed members of the genus have sprung. Consequently, those species which have to some extent retained such characters in the adult state (*i.e. Corilla anax* and *C. beddomeae*) are the older forms; while those species which diverged most in the adult state (*i.e.* the group of *Corilla erronea*) are of more recent origin. Assuming that the prototype which gave rise to the armed forms was devoid of armature, the *Corilla charpentieri* group would represent the oldest forms of all, while *Corilla beddomeae* and *C. anax* would come next in the line of descent in one direction; *C. humberti* still later, but in another direction; next *C. odontophora*, *C. erronea* and *C. rivolii* would appear to have branched off in separate directions; and lastly, *C. erronella* and *C. fryae* have diverged from the common stock. As it is extremely difficult to indicate the true relationship between any given group of species in a linear arrangement, I have attempted to overcome this difficulty in the accompanying diagram. It will, of course, be understood that this has reference to conchological characters only.

I append a key to the species of *Corilla* which I venture to hope will prove serviceable:

A. Shell without internal folds.
- *a*. Shell large, diameter 29 mm. . . . *charpentieri*.
- *b*. Shell smaller, diameter 22 mm. . . . v. *hinidunensis*.

B. Shell with internal folds.
- a. Palatal folds oblique.
  - α. Two parietal folds . . . . *beddomeae*.
  - β. Three parietal folds . . . . . *anax*.
- b. Palatal folds horizontal.
  - α. One parietal fold . . . . . *humberti*.
  - β. Two parietal folds . . . . *odontophora*.
  - γ. Three parietal folds.
    - * Shell elliptic, palatal folds short, second scarcely curved.
      - † Lip much reflected . . . . . *rivolii*.
      - †† Lip little reflected.
        1. Third palatal fold, almost horizontal . . *erronea*.
        2. Folds very short, nearer aperture, third palatal fold very oblique, ascending v. *erronella*.
    - ** Shell rounded, palatal folds longer, second much curved . . . *fryae*.

In concluding the consideration of the genus *Corilla*, I take the opportunity of expressing my grateful thanks to Mr. John Ponsonby, Colonel Beddome and Dr. Brot, for their kind and liberal assistance with specimens and information, and to Lieut.-Colonel Godwin-Austin for valuable information and suggestions.

(*To be continued.*)

# THANET SANDS.

By Geo. Barham.

IT was with great interest that I read Mr. Martin's notes (*ante* p. 54) entitled "Thanet Sands," in the neighbourhood of Herne Bay and Reculvers, as I was for some few years resident in that district, and rather closely studied its historical and geological features. The latter portion of his notes is the part to which I wish to refer; as I am very much afraid that his theory of the rising of the land is untenable. Neither do I quite see how, if accepted, it explains any of the difficulties presenting themselves to the student. Take for example Bishopstone Dell; as near as I can recollect, this runs back for even less than a quarter of a mile inland; and the depth of the gully is fairly estimated at fifty feet. It runs down to the beach or sea-level. If the land had risen from that level one foot, two feet, or fifty feet, how would it have aided the cutting out of this declivity? Such a process must have been gradual, and its effect would simply have been to convert the tiny stream into a small waterfall on the old sea coast, and consequently start a cutting-back of the soil as is noticed at Niagara. It is fairly proved that the land has, just there, been "eaten" by the sea; so that by this time all traces of our waterfall would have vanished and the position with regard to the big gradient of fifty feet in a quarter of a mile would be the same. No, during our investigation there, so far from imagining a rise, I and my father have been, at times, compelled to theorize about a sinking of the land in the patch of country bounded by the river and sea from Faversham to Birchington, and for an average of five to six miles inland. Yet your correspondent, by travelling up to Whitstable, and looking at the marshes, and watching the sea coast at low tide off Graveney, might well be excused for building up his theory. Land only two or three inches at most above sea level, strong sea walls to keep out the tides—resembling those on the coast of Holland—tide going out from two to three miles, according to the wind, may well combine together to almost force one into belief in the rising-land idea.

The closing up of the estuary of the Swale could be easily made to occur by simply allowing nature to take her course, and without altering the level of the county in the least, by simply removing the "jetties" or timber baulks running down the beach from land to sea, which man has placed at every few yards along the coast from Whitstable to Beltinge. The two big rivers, Thames and Medway, flow into the sea near here, and the tiny little Swale comes southward round the Isle of Sheppey. The back eddy or wash of these first-named rivers, aided by the setting of the tide from the German Ocean, forces the waters every tide up to the Swale, carrying with them shingle, sand and ocean refuse of every description, which is left in the sea bottom, between Shellness and Harty Ferry, on the Isle of Sheppey, and Whitstable on the main coast. Reculvers and Herne Bay being at the mouth of this swirling eddy, are robbed every tide of sand and clay, which is carried westward, assisting in the silting up of the Swale.

Owing to this carrying of débris and the existence of the small, practically unimportant Swale, a possibly unique thing has happened, which causes the local geologists—who are almost all "land-risers"—to triumphantly smile at the folly of us who cannot see as they do. I allude to Whitstable "Street." This is a narrow belt of shingle, mud gravel and refuse running for from three to five miles into the sea, and almost bare at low water. At its extreme end, enormous quantities of Roman pottery are found—of which, I may add in parenthesis, the finest collection in England belongs to my father, and the next to Liverpool Museum—in various states of preservation. This "Street" they say is a gradual rising of the sea bottom, because it is growing wider and more shallow in historical times. It is not, in the sense they mean, neither is it the "remains" of a tongue of land stretching into the sea, although it is beyond doubt that even in Roman times the coast-line was four or five miles farther out. It is merely a very quiet, business-like, easy-going "bar," caused by the current from the little Swale meeting the aforementioned tides. So far from the land having risen, it has, if anything, gradually sunk. That it has actually sunk in places I have direct proof, but as I am not writing a geology of North-east Kent, I will not trespass on your space so far as to dilate upon that. Let Mr. Martin go to the coast between Whitstable (Swalecliffe) and Hampton, and see a tiny little stream there, running a few miles inland, and measure the old river-bed that he will find there, having an average depth of twelve feet and a width of nearly a quarter of a mile. If he does, and also searches in that river-drift, wherein he will find many quaint and curious things, he will probably find a more simple explanation of the peculiar Bishopstone Dell than the land-rising theory.

*9, Ruskin Street Nottingham.*

# CHAPTERS FOR YOUNG NATURALISTS.

(*Continued from page* 65.)

## Speed of Solar Planets.

By Cyril Carr.

BECAUSE the Earth does not appear to us to move, we might suppose it to be fixed in space, and that the stars, sun and moon move round it, as thought the astronomers of ancient times. As we cannot see the whole of the world at once, it was in those days a very difficult matter to prove. The apparent movement of the constellation of the Great Bear, always visible in the northern sky on clear nights, served as the key to the mystery. By watching it revolving every twenty-four hours, a suggestion of the spherical form of the Earth was obtained. This observation, followed up by thoughtful philosophers, told us of the Earth's rotundity.

Our own planetary rotation appears to be slow, but in reality it deceives us. In order to make the reason more clear, I will illustrate it by simple methods that will indicate the true velocity in the rotation of the Earth and the planets.

Suppose a high post be placed in the ground on the equator, pointing upwards a little below the brilliant star Regulus, in the zodiacal constellation Leo, in order to mark a spot from which we are to start in a railway train at a rate of sixty miles an hour, and dash along the equator right round the earth. Suppose again, we leave the appointed place on January 1st, and travel along without stopping, we shall not arrive back from our trip round the world until the 18th, making eighteen days on the journey. The starting-post turns away as the earth turns round, and passes all through the zodiac till it arrives back in a little less than twenty-four hours. That is to say, this post, in twenty-four hours, has moved with one spin of the Earth entirely round the equator, a distance of about 25,000 miles, at a speed of more than 1,000 miles per hour, while the train takes eighteen days to go over the same distance. So the Earth spins round at a rate more than fifteen times greater than that of the fastest train.

We will imagine the train now moves along the same railway-line from east to west, in the direction that the stars apparently move across the sky; and, as we go, we look through a window in the roof of our carriage at the star Regulus, for the purpose of watching the difference between the velocities of the train and of Regulus. We will mark the position of the star by a spot on the window, and then carefully look at the star after some hours. We shall see that it seemingly travels faster than the train, and sinks below the western horizon, disappearing from view directly ahead of us; then, after about eighteen hours, Regulus re-appears in sight behind us, above the eastern horizon, and arrives overhead again in about seven hours. Yet the train has not gone round the world, but has only covered about 1,440 miles in this time.

Let us imagine a gigantic spear could be suspended from the sky with its point downwards towards London. Now what would become of the spear supposing it were not instantly burnt up by friction of the passing air? The inhabitants of London would be thrown into great excitement by hearing the sound of some awful roaring noise over the capital as the spear rushed through the Earth's atmosphere. Immediately they would run out and look up at the sky, but would see nothing, as the spear-point would have passed miles away in a second. If the spear remained in position for several days, it would flash across London, from east to west once every twenty-four hours, showing only the faintest streak in the sky. This should serve to illustrate the velocity of the Earth's rotation, which is something like 1,040 miles an hour at the equator. Now, if we could imagine the same experiment occurring in Saturn or Jupiter, as the spear-point flashed across the sky, the faint streak observable there would be very much finer than on Earth, and nearly invisible. The velocity of Saturn's rotation at the equator is known to be about 22,500 miles an hour, or about twenty-two times quicker than that of the Earth, for Saturn is a much larger body than the Earth, and yet revolves on its axis much more rapidly. As to the same occurrence in Jupiter, the flash of the spear-point across the sky, would be invisible, as the velocity of this planet's rotation at the equator is 28,000 miles an hour.

There is also another kind of motion possessed by our planet, which is its onward journey round the sun. We should obtain a very good idea of this if we were to imagine ourselves lifted out of the world into space by a gigantic man, in whose hand we could rest in a fixed position. Then, to our great surprise, the Earth would at once rush off with fearful rapidity and would be over eighteen miles away from us in a second, or about 67,000 miles an hour. This illustrates the yearly orbit of our planet round the sun. When we remember that the sun also is moving and bearing the Earth and other planets with it, we see that they really travel in a spiral course through space.

We know that all the stars in the celestial dome seem, to the naked eye, fixed in their position, except those distinguished from the others as planets, which are wandering through the heavens on their yearly journey round the sun. Exceedingly careful astronomical observations and measurements taken by the most accurate instruments, have shown that the stars make extremely minute movements on the face of the sky. Supposing we were living for a thousand years, we might be able to notice a very slight alteration of position of some fixed stars in the sky, which would, in reality, represent many millions of millions of miles journey of those stars during that time. One of the brightest fixed stars, Arcturus, possesses the marvellous velocity of fifty-four miles a second, but their vast distance from our solar system makes their motion seem so small. This can be illustrated more plainly. It is well-known to everybody that when we look out of the window of an express train in motion at telegraph posts and then at distant trees, the former will pass the window very quickly on account of their nearness to us, but the trees, which are several miles away from the train, appear to pass only very slowly, because of their long distance away. It is quite the same with the stars in the sky, only there we deal with distances far more immense.

42, *Southbourne Road, Sheffield.*

## STARFISHES OPENING OYSTERS.

IN the part recently issued of the "Journal of the Marine Biological Association of the United Kingdom" (vol. iv., No. 3), is an illustrated article by Dr. Paulus Schiemenz, which settles the long-discussed question whether starfish really open oysters. After reviewing what has already been written on the subject, Dr. Schiemenz clearly shows that the mild and harmless-looking "five-finger" is really a desperate marauder, who, by force and persistence, makes the timid oyster yield to his voracious appetite. Should the prey resist the attack of *Asterias*, but open his shell ever so small a space, the starfish coolly inserts its own stomach between the oyster-shells and absorbs all the juices and digestible substances.

In conclusion of his most interesting article, which shows by experiments how the starfishes effect their entry into the oysters and other bivalve marine mollusca, the author advises the oyster-culturists to destroy every star-fish they can find in their oyster-parks. It is not sufficient to tear them asunder, for the pieces have the power not only of continuing to live, but of developing new limbs, so that the process of apparent destruction only increases their numbers.

## A MOTH NEW TO BRITAIN.

CALOPHASIA PLATYPTERA, Esp

ON the 14th of September, when examining land-shells on the Sussex coast, between three and four miles west from Brighton, I observed a greyish-looking noctua at rest in a rough hedge. Being quite unprepared for insect collecting, I had no box, but seeing at once that it was something new to our fauna, I marked the place and started off to the nearest village to get one. I had not, however, gone far before I found an empty chip match box, into which, with some little trouble, the capture was safely placed. There it remained until the next afternoon, when I had the pleasure of handing it over to my friend, Mr. C. A. Briggs, to add to his brother's collection. Whilst Mr. Briggs was transferring the novelty from the match-box to a glass-topped box in my room at Northumberland Avenue, the moth escaped, and nearly disappeared through the open window. Again it was secured and eventually killed, and set out by Mr. Briggs.

Next month I propose to describe it fully after drying and removal from the setting-board. Sufficient now to say that I find our new addition is a member of the genus *Calophasia* and I feel pretty sure it is *C. platyptera*, of Esper, but this opinion has to be confirmed by comparison when the specimen is dry. This genus is allied to *Cucullia*, and my capture is like a little "shark" moth of light greyish colour.

The range of *C. platyptera* is mid- and south-European. Its time of appearance is given as varying from June in the extreme south, including Asia Minor, to August further north. The larvæ feed on, among other plants, common toad-flax and its allies. My specimen was, when found by me, as fine in condition as though only just emerged from its pupa, and it fortunately was not injured by its various adventures.

The locality of its capture adjoins rough fields, which have been allowed to run wild, and where brick-making is going on. I believe the species only requires working for by those who desire to get a series.

JOHN T. CARRINGTON.

ABNORMAL VEGETABLE-MARROW.—A remarkable instance of the fusion of a branch of the parent stem with the fruit of a vegetable-marrow has occurred in our garden. The branch was apparently resting along the fruit in question when, instead of pushing the branch away, the fruit commenced to absorb it, growing over the sides until the stem was in places covered with the fleshy part; while all along its length, for about fifteen inches, it was firmly attached to the "marrow," from which in one place flowers, both male and female, were growing.—*C. A. Briggs, Leatherhead, Surrey; September*, 1896.

## MICROSCOPY

A New Seaweed.—It was announced at the meeting of August 6th, of the Dublin Microscopical Club, as reported in the September "Irish Naturalist," that *Asperococcus compressus* had been dredged off Go Island, co. Donegal, by Miss R. Hensman and Professor T. Johnson. This brown alga is an addition to the marine flora of Ireland. Being a southern type, its occurrence so far north is remarkable. A microscopic section was exhibited at the meeting.

Popular Microscopy.—The influence of a popularly written article on any subject has seldom been more clearly shown than in the results of one on "The Microscope," which appeared in a recent number of the "Strand Magazine." The writer gave some amusing instances of the pleasures to be obtained from the use of the instrument. We hear from the manager of the firm of makers of microscopes and their accessories whose name was incidentally mentioned in the article, that since its appearance their staff has been occupied in clearing off orders traceable to readers of that magazine.

Mounting Medium.—Could you tell me through your valuable paper what is the very best medium that you know for mounting desmids, algæ, etc., in, so that the original colour may be definitely and permanently retained?—*R. Trist Searell, Christchurch, New Zealand.*

[*Mounting medium.*—Acetate of copper solution is the best medium for mounting desmids and all green algæ.

| | |
|---|---|
| Acetate of Copper .. | 15 grains |
| Camphor Water .. .. | 8 ounces |
| Glycerine .. .. .. | 8 ounces |
| Glacial acetic acid .. | 20 drops |
| Corrosive Sublimate .. | 1 grain |

The above solution can be used as a preserving and mounting fluid. It keeps the colour of green chlorophyll perfectly. Mount in a shallow cell of vulcanite. Metal cells must not be used. When the specimens are very delicate, leave out the glycerine.—*Martin Cole.*]

Hygroscopic Hairs of Wood-rushes.—The curiously energetic movements of the elaters of the spores of horsetails *(Equisetum)*, when gently breathed upon, are probably familiar to all users of the microscope; also, the similar movements of the teeth of the peristome of the capsules of mosses. In these cases it is not difficult to see that the hygroscopic movements of the organs in question are of great importance to the plants concerned. Hygroscopic movements take place among the hairs of wood-rushes *(Luzula)*, where, however, it is not easy to say of what use these movements are to the plants that exhibit them. If a portion of a living or dried wood-rush is taken, and the breath gently falls upon the hairs clothing the stems and leaves, these are immediately violently agitated, and twist and writhe in all directions. So energetic are these movements that they continue sometimes for two or three minutes after the disturbing cause has ceased.—*C. E Britton*, 189, *Beresford Street, Camberwell.*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Plants of Manitoba.* Forty coloured plates of flowering plants, 10 inches by 7 inches, in portfolio. (Belfast, London and New York: Marcus Ward and Co., Limited, 1896.) Price 10s. 6d.

This portfolio contains forty beautiful examples of the colour printing for which the publishers are so justly celebrated. It is a great pity there is no letterpress explaining the plants, or even the artist's name. They are admirably drawn and, with one or two exceptions, the colouring is most life-like. For instance, the wild bergamot (*Monarda fistulosa*) should be rather darker and richer in colour of the flower, for it is the variety *mollis* of this species which occurs in Manitoba. This plant, by the way, is, we think, more generally known as "Oswego tea." The flowers of the fringed gentian (*Gentiana cristata*) should be a much richer blue. The plate of golden-rod (*Solidago serotina*) is admirable, and reflects the highest credit on both artist and colour-printers. Nearly as successful is the drawing of the wild rose (*Rosa blanda*, var. *setigera*), which, by the way, is hardly the wild rose of Manitoba prairies, where the type is *R. arkansana*. It occurs in magnificent profusion, even to becoming one of the farmers' troublesome corn-weeds. Among the illustrations are two of the Russian thistle in its green and autumnal states. This plant, our familiar sea-side denizen *Salsola kali*, is native to Canadian and North-American shores. It is the Eastern variety *tragus* that has been introduced by Russian immigrants, and has not only become colonised and improved, like its introducers, but unlike them, has grown to be a curse to some of the more northern of the United States, such as North and South Dakota, where the soil is alkaline. So far it has not done much harm in Manitoba, where it does not appear to thrive so well as in the States south of that province. Of course, a collection of forty plates gives but a small idea of the magnificence and abundance of the flora of the prairie province of Manitoba, where, from early spring to late autumn, there is a succession of flowers in such profusion as often to brilliantly light up the landscape with blues or yellows in rich patches of colour. As an example of the number of species to be found there, in one month—September, 1894—the writer gathered, while assisting a friend, no less than 360 species of flowers in bloom. Those now under notice were collected in an earlier month of the summer, when many more species flower, though they contain several which were found with late, or second flowering, in September. The Canadian Government and the Canadian Pacific Railway Company would do well to exhibit this handsome little portfolio among the inducements to settlers, who cannot fail to think the land which produces these flowers must grow other crops for their benefit. We hope the publishers of this portfolio will receive sufficient support by its sale to induce them to publish a further series, when letterpress descriptions and title-page might be issued for both series.

*Missouri Botanical Garden: Seventh Annual Report.* 209 pp. royal 8vo, and 66 plates. (St. Louis, Mo.: published by the Trustees, 1896.)

We have on former occasions had the pleasure of noticing these annual reports, which are so beautifully produced. The plates are American, and we must therefore conclude, admirable, from the artistic and mechanical points of view. The frontispiece, which represents a plant of the "edelweiss" growing in a rockery in the gardens, is a charming piece of photographic reproduction. The cost of maintaining these gardens is considerable, for we find by a statement of accounts for the year, the expenditure reached over £17,000. There are several important papers in this Report, including one by Mr. William Trelease on "The Juglandaceæ of the United States," which is illustrated by twenty-five plates of the native hickory trees, which are allied to the walnuts. There is also an important paper by A. Isabel Mulford, entitled "A Study of the Agaves of the United States" with a number of artistic photographs on thirty-seven plates. These remarkable plants thrive largely in the arid tracts of desert north of and including Mexico. Some species are of much economic value, and were used even in Aztec times. They produce a fibre from the leaves, which is worked much as hempen fibre, and used for like purposes. At least one species is now cultivated for this reason, and efforts are being made to introduce the fibre as a commercial staple; plantations of one species, *A. rigida*, var. *sisalana*, having been formed in Southern Florida and the Bahamas. This Report contains other papers and notes of value.

*The X Rays.* By ARTHUR THORNTON, M.A. 63 pp. foolscap 8vo, with 26 illustrations. (London and Bradford: Percy Lund and Co., Limited, 1896.) Price 6d. net.

This pleasing little work forms No. 10 of the "Popular Photographic Series," and in Mr. Arthur Thornton's hands the subject of the Röntgen rays assumes a simplicity which will be welcome to many of our readers. Commencing with the whole subject of vibrations, including those of sound and light, the author leads up to Prof. Röntgen's recent discovery and its later development. Although the subject is sketchily treated in consequence of the limited space available, it is just what a general reader requires to post him up in this new form of photography and its possibilities.

*Handbook to Liverpool and the Neighbourhood.* Prepared by various authors for the Publications Sub-Committee of the British Association. Edited by W. A. HERDMAN, F.R.S.; 191 pp. 8vo, with maps and charts. (Liverpool: Philip, Son and Nephew, 1896.) Price 2s. net.

Professor Herdman's energy in providing for the success of the Liverpool meeting of the British Association is further shown by the publication of this admirable handbook to the city. By its means he personally conducts the visitors to its history, geology, vertebrate, invertibrate and marine fauna; the entomology, botany, climate, the river and its tides, docks and other engineering works, trade and commerce, and its chemical industries. To all this is added an appendix on the Isle of Man, including a geological map of the island, also plan of the sea around, with biological chart of the Irish Sea, chart of Liverpool Bay, and a useful geological map of the country round Liverpool. It is needless to point out that under Professor Herdman's supervision the various authors of the articles have brought the information up to the latest date, so that this handbook will be a work for reference for some years to come. For that reason we are sorry to find the binders have omitted to put the title on the back, and thus risk the loss of the book when placed on the library shelves.

*Wayside and Woodland Blossoms.* (Second Series.) By EDWARD STEP, F.L.S. 185 pp. small 8vo, with 130 coloured and 23 uncoloured plates. (London and New York: Frederick Warne and Co., 1896.) Price 7s. 6d.

These little books are evidently popular, for the first series has gone to a new edition, and the publishers seem to consider it worth while to issue a second series. In this volume the author treats of 325 species, thus the two volumes cover no less than 725 of our commoner flowering plants. The work will do much to familiarise many persons with British plants, who rather dread the systematic study of our flora, and will lead others to a desire to know more about the "wayside and woodland blossoms." The second series recently issued, shows indications of better printing of plates and colouring, also improvement in the text. We can strongly recommend the managers of school libraries and others to place these two volumes within reach of young people under their charge.

*The Photogram.* Edited by H. SNOWDEN WARD and CATHERINE MEED WARD. (London: September, 1896.) Monthly, price 6d.

It has seldom been our pleasure to see a more beautifully illustrated magazine than the September number of "The Photogram." The series of articles on "Beauty Spots" has reached No. 6, which relates to "London Town." We are delighted to see that some one has taken up the artistic features of London. Long have we felt there was ample scope for articles on the picturesque spots so abundant in what people are still apt to describe as "dirty, smoky London." This opinion was only too much supported by one artist of note who drew London. We refer to Mr. James Whistler's nocturns. Now we have the bright side treated, and we fully agree with Mr. Hamilton East, the author of "London Town," that the artist, whether in fact or in fancy, will find abundance of the picturesque within seven miles of the General Post Office. In "The Photogram" for this month are examples beautiful enough to tempt many to commence searching for these quaint corners. The rest of the articles in this number are good, and helpful to amateur photographers.

*Tourist Guide to the Continent.* Edited by PERCY LINDLEY. 163 pp. 8vo. Seventh Annual Edition, illustrated, and with maps. (London: Great Eastern Railway Company, 1896.) Price 6d.

A prettily illustrated, useful guide, full of just the kind of first information an intending tourist in Europe requires. Although doubtless issued as an advertisement for the Great Eastern Railway Company, this guide so little partakes of that character as to constitute itself well worth its price.

*Insects and Spiders.* By J. W. TUTT, F.E.S. 116 pp. 8vo, illustrated by xviii. plates. (London George Gill and Sons, 1896). Price 1s.

This little book contains fifteen lessons on Entomology and Spiders, which are illustrated by common or easily attainable examples. The book is Part ii. of Gill's Practical Series of Object Lesson Books, that has been called forth by the new School Board code.

## SCIENCE GOSSIP

The meeting of the British Association at Liverpool, just concluded, seems to have been an unqualified success. Some 3,000 people became ticket-holders on the occasion.

Liverpool was fortunate in having so important a personage as the Earl of Derby for its Lord Mayor for the year of the British Association meeting. His wealth and position in themselves lend aid to both the City and Association.

The subject of the inaugural address by Sir Joseph Lister, Bart., P.R.S., was happily chosen from the popular point of view. He discussed the benefits conferred upon the human race by some applications of science, and pointed out how suffering humanity had been alleviated by such discoveries.

The greatest among scientific discoveries which have aided the medical faculty have been the work of men of science apart from the professions of surgery and physic. For instance, the discoverers of anæsthetics, bacteriology and its bearing upon human suffering, also, most recently, the Röntgen rays, the application of which will mark an epoch in surgery. In one of these subjects the President of the Association is an authority; his own work in the investigation of the behaviour of wounds, and the influence of bacteria on such behaviour, is world-wide in its reputation.

Very different to our British Association Meetings have been those of the kindred American Association for the Advancement of Sciences. The meeting held last August, in Buffalo, could muster no more than 330 attending members. This must have been discouraging, for at the meeting in 1880, at Boston, we notice there were 997 members. Since then, we learn from "Science," the numbers have gradually decreased, though a weak spurt has occasionally shown itself.

The highest attendance at the meetings of the American Association has been in the older and more cultured cities, Boston, Philadelphia and Montreal leading the way with each over 900 members. Curiously, there was a deep descent in the numbers at New York, whilst Brooklyn could only muster 488 members.

There appears to be something wrong about the American Association, perhaps it is its social side that wants looking after. Maybe science has not got hold of the "people" of the States as it has in this country, who may imagine that there "is no money in it" for them individually. If that is so, not even the social entertainments will command an attendance of 3,000 five-dollar ticket-holders in any American city, as at Liverpool this week.

In the September number of "Symons' Monthly Meteorological Magazine," Mr. Symons illustrates what he claims to have been the first daily weather map issued. It was sold at the great exhibition of 1851, from August 8th to October 11th of that year.

A brilliant meteor was observed on Saturday night, September 12th, at about 10.25. Notes of its occurrence come from places as far apart as North Devon and South Yorkshire.

The "Journal of the Marine Biological Station of the United Kingdom," for the August quarter, contains several important articles and the Annual Report of the Council for 1895-96. The laboratory at Plymouth continues to afford excellent scientific results.

We are pleased to hear that Mr. A. J. R. Trendall has been appointed Assistant Secretary in the Department of Science and Art, in succession to Mr. G. F. Duncombe who has retired. Mr. Trendall has been well known in the department for many years.

The Entomologist and Zoologist to the Agricultural Experiment Station of New Mexico, U.S.A., Mr. T. D. A. Cockerell, has forwarded Part i. of his Report in his first capacity, dated April, 1896. It possesses many items of interest to others than the people of New Mexico.

The science of "flying" by mechanical aid progresses slowly and not without its toll on its votaries, whom we every now and then hear of being killed. There are rumours of wonderful machines yet "in the dark," so we must wait whilst more enthusiasts are slain or maimed.

This seems to have been an exceptionally good mushroom year, but there have been more deaths than should have occurred through mistakes with poisonous fungi. It is quite time some means were organized for teaching people the difference between *Agaricus campestris* and some of its deadly allies.

Several important gifts are announced as having been accepted by the Lick Observatory. They include funds for photometric apparatus for the equatoreal from Miss Caroline Bruce, of New York, and for the publication of a new lunar atlas, by Mr. Walter W. Law, of Scarborough-on-Hudson.

We receive from time to time the exceedingly well-arranged programmes of the field meetings of the Yorkshire Naturalists' Union. These circulars could be taken as a model by some other field clubs. That now before us relates to a fungus foray in the neighbourhood of Selby, from the 19th to the 22nd of September.

The publications of the Field Columbian Museum of Chicago have been divided to suit the convenience of scientific workers. The following series have been established: Historical, Geological, Botanical, Zoological, Ornithological and Anthropological. We have received the Zoological Series, vol i., Nos. 4 and 5 being on fishes of the Kankakee and Illinois Rivers; and on *Foxschelys latiremis*.

Senator Palmieri, better known as Professor Luigi Palmieri "The Custodian of Vesuvius," died on September 10th, at the age of eighty-nine. Since 1854 he has been Director of the Vesuvius Meteorological Observatory. Among his inventions of scientific instruments is one which has been invaluable to Seismologists for detecting earth tremblings. After holding several minor professorships he occupied the chair of Physics at the Royal Naval School at Naples and also at the Naples University.


CONDUCTED BY FRANK C. DENNETT.

| | Oct. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 9 | 6.16 a.m. | 5.19 p.m. | 13.2 | 6° 34′ S. |
| | 19 | 6.33 | 4.57 | 13.39 | 10° 16′ |
| | 29 | 6.50 | 4.37 | 14.17 | 13° 43′ |

| | | Rises. | Souths. | Sets. |
|---|---|---|---|---|
| *Moon* | 9 | 10.12 a.m. | 2.9 p.m. | 5.56 p.m. |
| | 19 | 3.55 p.m. | 10.29 | 4.9 a.m. |
| | 29 | 10.42 | 5.44 a.m. | 1.48 p.m. |

| | | Souths. h.m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 9 | 11.39 a.m. | 5″ 0 | 12.54 | 7° 31′ S. |
| | 19 | 10.44 | 4″ 0 | 12.38 | 2° 38′ |
| | 29 | 10.41 | 3″ 0 | 13.15 | 5° 38′ |
| *Venus* | 9 | 1.21 p.m. | 5″ 6 | 14 35 | 15° 13′ S. |
| | 19 | 1.30 | 5″ 8 | 15.24 | 19° 8′ |
| | 29 | 1.42 | 6″ 0 | 16.15 | 22° 13′ |
| *Mars* | 9 | 4 28 a.m. | 6″ 0 | 5.42 | 23° 14′ N. |
| | 19 | 3.59 | 6″ 5 | 5.52 | 23° 39′ |
| | 29 | 3.25 | 7″ 0 | 5.57 | 24° 5′ |
| *Jupiter* | 19 | 8.34 a.m. | 15″ 4 | 10.24 | 10° 57′ N. |
| *Saturn* | 19 | 1.14 p.m. | 7″ 1 | 15.8 | 15° 30′ S. |
| *Uranus* | 19 | 1.29 p.m. | 1″ 8 | 15.23 | 18° 19′ S. |
| *Neptune* | 19 | 3.25 a.m. | 1″ 2 | 5.17 | 21° 39′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Oct. 6 | 10.18 p.m. | *1st Qr.* | Oct. 13 | 2.47 p.m. |
| *Full* | „ 21 | 4.17 „ | *3rd Qr.* | „ 29 | 3.21 „ |

SUN.—The spots are small and few in number, many appearing as the merest pores, quite hidden by the faculæ as they approach near the limb.

MERCURY is very badly placed for observation early in the month, being in inferior conjunction with the sun on October 8th, but improves somewhat later in the month, reaching its greatest elongation W. (18°) on the 24th, at 8 a.m.

VENUS is poorly situated all the month.

MARS is getting into good position for the ordinary observer, rising in the evening at 8h. 32m. on 1st, and a few minutes before 6 o'clock on 31st. Its angular diameter is, however, less than half that of Jupiter, but many of the details of its surface are very evident, even with the aid of small instruments.

JUPITER may be observed in the later morning hours, rising at 1.30 on October 20th.

SATURN and Uranus are too near the sun for observation.

NEPTUNE'S tiny disc is on the meridian about 4m. earlier than that of Mars on 19th, and so is getting into fair position for observation.

METEORS may be looked for on October 13th, 15th, 17th, 18th, 22nd, 24th and 29th, many radiating from Orion and Gemini.

BROOKS' tiny comet is now getting farther from the earth, though still nearing the sun.

VARIABLE STARS.—During October observations should be made on—

| | R.A. h.m. | S. Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| *o* Ceti | 2.12 | 3° 34′ | 1·7 | 9·5 | 331·3363 days. |

This star long since earned for itself the title of Mira. In colour it is usually yellow, though Sir John Herschel described it as very full ruby. It is not always equally brilliant at maximum, and its period was said by Argelander to show a probable regular alternation to the extent of twenty-five days. Its last maximum was reached about February 12th last, when its magnitude was about 3·5. The star, *α* Cassiopeæ, in last month's list, requires careful observation, as periods so different as 79·1 days and 50·98 days have been assigned to it.

THE TOTAL SOLAR ECLIPSE.—Although our Astronomer Royal at Jesso and the friends at Vadso were disappointed, successful observations were made by Dr. E. J. Stone and Mr. Shackelton at Karmakul Island, Novaya Zemlya, whither they had been taken by Sir George Baden-Powell in his yacht, the "Otaria." The Russian observers at some of the Siberian stations, and observers at Bodo, in Norway, and some other places, also seem to have made successful observations.

REMARKABLE OBSERVATIONS.—The "New York Herald" records that on July 21st, Prof. W. R. Brooks, of the Smith Observatory, Geneva, N.Y., whilst observing the moon with the 10-inch equatoreal, saw a round, dark object pass slowly before it. It appears to have been a meteor too far from the earth to have been rendered incandescent by its atmosphere. The object moved horizontally from east to west, the transit occupying three or four seconds. The apparent diameter was about one-thirtieth that of the moon. The real distance from the earth being unknown, it is, of course, quite impossible to give the real diameter of the meteor. On June 27th, at 1 o'clock in the morning, the writer of these notes was looking at the moon with a 2-inch achromatic, power 44, when a tiny black object, slightly elongated, slowly sailed past from west to east, the transit occupying three or four seconds. This object was believed to be a bird of large size at a considerable distance. There was, however, nothing like fluttering observed.

DR. HUBERT A. NEWTON, Professor of Mathematics at Yale College, has passed away. He interested himself much in the motions of comets and meteors, and did much to establish the fact of the orbit of the November Meteors, and predicted the great shower of 1866, which is expected to be repeated again in 1899. He was born in 1830, at Sherburne, N.Y., and in 1872 was elected an Associate of the Royal Astronomical Society. In 1875 he was chosen Vice-President, and in 1885 President of the American Association for the Advancement of Sciences, of which he had been a member since 1850.

ANOTHER LUNAR OBJECT.—The northern of the three craters crossing the eastern floor of the Mare Crisium, known as Peirce A., is very interesting. It is the smallest of the three, and in a drawing by Mr. Edmund Neison, dated July 27th, 1877, is shown as joined to Peirce by a ridge, having a convexity towards the west. About three days after the sun has risen upon it, a brightish ring appears on the Mare around it, and remains visible until about sixty hours before the sun sets upon it. The area within this ring is darker than the surrounding surface. The northern wall of the crater seems to be near the centre of the ring. There appears to be some doubt about the constant visibility of the crater, some observers claiming the total disappearance of Peirce A. under a high sun, while some never seem to quite lose it. The writer has always seen the north wall as a bright spot in the middle of the darker area, with one exception, 1895, March 11th, 2 am. Attention to this crater might prove useful.

# SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

La Feuille des Jeunes Naturalistes (Paris, September, 1896). Dr. E. Fournier contributes an interesting and instructive article on "Geographic Botany," in which he deals with the zones of vegetation of the Caucasus. This mountain chain does not constitute, from a botanical point of view, a typical province, in which differences of altitude only influence the distribution of plants. Presenting over its whole extent a great variety of climate, it furnishes consequently a large number of biological divisions, each characterized by special groups of species. These divisions are, going from west to east: the Black Sea district, the Western Transcaucasian district, East Imeritia, Georgia, and Khakhetia; the European Steppes district, the Asiatic Steppes district and the Saline Steppes district. Independently of these divisions, five principal zones of altitudinal distribution may be distinguished: Inferior zone to 900 metres, in which many exotic plants are cultivated; zone of the beech and chestnut, from 900 to 1,500 metres; zone of the conifers, from 1,500 to 2,000 metres; Sub-Alpine zone, from 2,000 to 3,000 metres; Alpine zone, from 3,000 metres to the limit of vegetation, which is excessively variable. The Alpine zone has many plants in common over all the six divisions, such as *Primula grandis*, two species of *Campanula*, *Gentiana pyrenaica*, *Veronica gentianoïdes*, *Myosotis sylvatica*, *Rhododendron caucasica*, and others. The Sub-Alpine zone also has several plants in common over the six divisions, birch, stunted beech, *Daphne*, *Viburnum lantana*, *Sorbus aria*, and others. The Conifer zone has *Picea orientalis* and *Abies nordmanniana* distributed over the first three divisions, the Black Sea Province, Western Transcaucasia, and the Imeritia District; while in the Eastern Caucasus, forming the three Steppes divisions, the Conifers are replaced by birches, except in Daghestan, where sometimes forests of *Pinus sylvestris* are found. In the beech and chestnut zone the differences in distribution over all the divisions become apparent, the first division, *i.e.* the Black Sea Province, having, besides the two trees which give its name to this zone, *Pinus halepensis* and *Pinus pinea*; the second district, Western Transcaucasia, contains, besides beech and chestnut, alder, oak, sycamore, *Rhododendron ponticum*, etc. The Imeritia district has its forests of birch and chestnut much thinner, interspersed with rhododendrons and azaleas; the European Steppes division is noted for *Berberis*, besides beech and chestnut, while in the remaining two Steppes divisions forests are very scarce. The inferior zone is most differentiated, the Black Sea Province being noted for *Pinus halepensis*, evergreen oaks, junipers and an abundance of Mediterranean species; the Western Transcaucasian division contains mixed forests, creepers, ferns, and a fair number of Mediterranean species; the Imeritian district produces *Rhododendron ponticum*, honeysuckle, paeonies and some Mediterranean species; in the European Steppes district grasses, Chenopodiaceae, Leguminosae, Labiatae and Artemisia abound; the Asiatic Steppes division is rich in pasturage, and produces *Sternbergia fisheri* and *Helleborus caucasicus*, while the Saline Steppes district has *Salsola*, *Artemisia*, *Euphorbia*, fennel, etc. One of the most salient points is the abundance of Mediterranean species in the whole of Western and Central Transcaucasia; while a noteworthy fact is the presence, among the species special to the Caucasian flora, of many types with tertiary affinity. These include *Quercus pontica*, an oak with simple leaves similar to those of a chestnut, *Betula medviedevi*, a birch with alder-like leaves, forming the passage between the Asiatic birches and an American species, *Betula lenta*. *Rhododendron ponticum* has been found in the tertiary beds of Austria; and many others. M. Raspail discourses on "Bird Migration by the aid of East Winds." In a short illustrated article on the marsh-otter or European minx, Mr. Anfrie refers to some previous remarks made about the occurrence in France of this animal (*ante* p. 51), and gives, besides a woodcut, some further information about this interesting and little-known carnivore.

Album der Natuur (Haarlem, 1896. Parts 1 and 2). An appreciative account of the late Louis Pasteur, with portrait, is contributed by Dr. H. P. Wijsman; while Dr. Tjaden Modderman discourses on the life and works of the physicist, Thomas Young, whose biography, by Peacock, was published in 1890, by Mr. John Murray. Dr. Hugo de Vries, in a note entitled "Species or Variety," discusses the history of *Chelidonium laciniatum*, which is looked upon as a species by some, as a variety of *Chelidonium majus* by others. It appears that a chemist in Heidelberg, Sprenger by name, found, about the year 1590, a new form of celandine in his garden; it was not found elsewhere, neither wild nor cultivated. Sprenger sent specimens to Bauhin, Clusius, Plater and others, all of whom admitted it as a new plant. It was soon distributed in botanic gardens in France, England, Germany and Holland. Since then it has occasionally been found as an escape, but has never been found really wild. That this form is constant, has been proved by cultivation; Miller raised it from seed during forty successive years, without ever noting the least reversion to the type. On the other hand, the common celandine is frequently sown on a large scale, yet this phenomenon, which presumably occurred in Sprenger's garden, has never been again observed. If perfect constancy and complete separation of two allied types are considered sufficient characters to regard both as distinct species, there can be no doubt that the two forms in question are true species. The writer of the article, without taking sides with either view, considers that the facts stated are of extreme importance to all who are interested in the origin of species. *Chelidonium laciniatum* behaves as a true species in giving rise to other varieties. The degree of division of the leaves is so variable that three different varieties can be distinguished, the variety *crenatum* being intermediate between the type and the variety *fumariaefolium*, in which the division is carried so far that the leaflets or pinnae are almost linear and very numerous. But it was found that all the three forms were obtained from seed of *C. laciniatum*. It was observed that some plants passed through all the three stages, beginning as var. *crenatum* and ending with the var. *fumariaefolium*. None of the seedling plants ever showed the least sign of reverting to the typical form of *C. majus*.

# NOTES & QUERIES

OTTERS IN BUCKINGHAMSHIRE. — The Bucks Otter Hounds are stated to have killed no less than seventy otters this season in the county. This does not look as though these interesting animals were becoming extinct.—*John T. Carrington.*

LATE SWIFT.—Whilst watching the birds on the lake in Kew Gardens to-day, I was surprised to note a solitary example of the swift (*Micropus apus*) still lingering here. I called the attention of one of the keepers of the gardens to the bird, who also recognized it as being undoubtedly a swift. Is not this unusually late? Referring to my diary I find my previous latest date, August 23rd, 1894.—*H. Mead-Briggs, Ealing; September 6th*, 1896.

WHIRLWIND OFF ISLE OF WIGHT.—On the evening of August 25th we were standing in the garden overlooking the sea, and watching the ragged edge of a very heavy black cloud passing over the sea from the north-west. About a quarter to seven o'clock one of our party drew our attention to a peculiar oblong projection hanging from the edge of this cloud. This projection rapidly became longer, till it reached a point about half-way between the cloud and the sea, when the lower part of it appeared to fall down, expand and become invisible, while the upper half gradually returned to the cloud. This action was evidently caused by a whirlwind, for that part of the sea on to which the lower half fell could be seen broken into spray, and moving, for a short time, rapidly in a south-easterly direction. We could hear no sound, but about a mile to the west the "roaring" of the water could be heard. The movement then subsided. The cloud scenery about this time was very fine, several curtains of dark cloud overhanging the sea. The next day a short but fairly heavy thunderstorm occurred, with showers of rain, and the weather in a very disturbed condition. Since writing the above, I hear that three waterspouts were seen on the same day, two off Atherfield, about four miles west of this place, and one off here. This last was described as a cylinder, down which water was being poured, while the tail of cloud connecting it with the cloud above was of serpentine or S form.—*Frank Sich, junr., Niton, Isle of Wight; August 27th*, 1896.

CATERPILLAR OF THE EYED HAWK-MOTH.—Early last June I had brought to me a pair of eyed hawk-moths (*Smerinthus ocellatus*) taken *in copula*. I placed the female in a large box, and had the satisfaction of obtaining about one hundred eggs from her. These, in the course of ten or twelve days, hatched out, and having no other food placed handy I fed the young larvæ on poplar, of which there was an unlimited supply in the neighbourhood. They readily took this, and allowing for deaths in skin changes and over-crowding, I think I was extremely successful in getting eighty to pass into pupæ. At one time it looked extremely doubtful if I should obtain anything like this number, as I was suddenly called away from home for a few days, just when the caterpillars were full-grown and were wanting to go under the earth. Having no earth available, when I returned I found to my dismay about thirty contracted forms to all appearances lifeless, but being busy I did not throw them away as was my intention. They remained like this in a box for some ten days. Noticing one of the others in the box where I placed the fresh food did not go under the earth that I had provided them, but only partly, as a dead leaf concealed it, had succeeded in becoming a chrysalis, I covered the thirty with a cloth, thus leaving them in darkness, and to my surprise twenty-three out of them passed into pupæ that same night. The others did so in the course of a day or so. This naturally has raised a thought in my mind—if the reason for passing under ground is to escape the light rather than for any other desire? It might furthermore be interesting to add that two of the thirty, in spite of the unpleasantness of their surroundings, do not seem to have in any way suffered, as on August 10th they emerged as perfect moths, thus making a double brood. Curiously these two both came out the same night, within a few minutes of each other. My attention was called to them as I was going to bed by the noise the chrysalis made in bursting; it was quite a loud "pop."—*H. Mead-Briggs, Canterbury; August 20th*, 1896.

THE LABEL LIST FOR FIVE-BANDED SHELLS.—Writing in a letter from Mesilla, New Mexico, U.S.A., August 15th, 1896, to Mr. Carrington, Mr. Theo. D. A. Cockerell says: "Many thanks for Label List of Snail-Shells—a very useful production certainly. I see Mr. Gude has given a review, so I will only concern myself with a few criticisms. The Conchological Society was quite illogical in its method of selecting varieties or mutations for citation, and you are equally illogical in following them. Under *Helix nemoralis* why are not *citrinozonata*, Ckll., and *rufozonata*, Ckll. (with yellow and rufous—*not* pink—bands respectively), as good as *roseozonata* and *hyalozonata*? Why is not *luteolaliata*, Ckll. (lip tinged with yellow), as good as *roseolaliata*? Why is not *tenuis*, Ckll. (MS., Marq., 1889), as good as the *tenuis* var. of *hortensis*? And I think *aurantia*, Ckll., 1885, the beautiful orange unbanded var., should be added, as also *petiveria* and *shideria*. These I recommend merely as ranking with those accepted. Others of less note I do not now press. In *H. hortensis* var. *luteolaliata* was defined and named by me in 1887, long before Mr. Adams. The form *rufozonata*, Ckll., 1887, should, I think, also go in; likewise *pallida*, Ckll., 1884. *H. aspersa* var. *lutescens*, Ckll., 1887, seems to me also valid enough. I know my views about naming variations are not orthodox, and I hope you will understand that I would not criticise you for not adopting them; all I urge is that you should be consistent in whatever system you do adopt. Now as to the band formulæ. It would have been very desirable to indicate which had occurred in Great Britain and Ireland, and which not. That would stimulate collectors to look for the missing ones. In "British Naturalist," July, 1894, you will find a list by me of those actually recorded up to the time I left England. Since then Mr. A. Belt has added two or three in a paper in Rep. Ealing Soc. I think Mr. Gude added a few in 'Field,' and perhaps some others have been recorded. A great deal more might be said, but I am writing at home and all my snail note-books and MSS. are at the college."

## ZOOLOGY

Abnormal Goldfish.—I have recently seen a three-tailed goldfish. A friend who showed it to me had three living specimens in his possession. Mr. Ford-Lindsay's note (S.-G., vol. ii, p. 327), reminds me of it. The upper lobe of the tail in each case was divided into two portions, and was spread out somewhat in the form of a fan, whose plane would be horizontal, and at right angles to the remaining lower lobe.—*Ed. A. Martin*, 62, *Bensham Manor Road, Thornton Heath.*

[This variety of goldfish has long been artificially cultivated by the Chinese and Japanese. They have been brought to great "perfection," the caudal fins far exceeding in length the body of the fish in good specimens. These abnormal fish may sometimes be seen in aquaria in England or in dealer's shops of London and Paris. We have known exceptionally fine examples to be sold for as much as five pounds per pair.—*Ed.* S.-G.]

Argynnis niobe in Hampshire.—I have every reason to believe that my brother and I have taken three females of *Argynnis niobe* in the New Forest, in the neighbourhood of Lyndhurst. According to Newman's figure and description, the insect certainly is *niobe*, but referring to Kirby and other authors, I find there is a considerable variety of opinion as to the characteristic markings of *A. niobe* and *A. adippe*. If not *niobe* it must be a variety of *adippe* with distinct metallic green markings on both upper and under sides, and the additional silver spot after the first basal series on the hind wing. In fact, in all respects it exactly coincides with Newman's figure. Newman records only one British capture, and Kirby thinks it a doubtful native species, considering many of the reputed captures are only varieties of the high-brown fritillary. As *Argynnis niobe* is a common Continental insect, I hope to have an opportunity of comparing our specimens with some foreign ones, and so ascertaining the species.—*Catherine A. Winckworth*, 11, *Old Steine, Brighton; August 18th*, 1896.

Nightjars hawking by day.—Whilst out fishing at noon-tide on August 3rd, I was surprised to see a pair of nightjars feeding on the wing. It is not a rare occurrence in shady woods to sometimes come across a slowly flitting bird in day-light that may have been disturbed, or whose parental duties have compelled it to cater for a hungry brood; but never before have I seen a pair wide awake in a blazing sun-shine, performing all the wondrous evolutions of the evening flight. There was no shelter near and the sun's heat was more than passing warm. I watched these birds for more than half an hour, and came to the conclusion they were simply hawking flies for their own consumption. They did not seem to mind my presence half so much as that of the swallows, which would attack them furiously from time to time. The female bird in fact once came and sat on a post not ten yards off me, while the male made himself at home on the edge of an old boat moored to the bank. Apparently they were feeding upon very small flies.—*H. Mead-Briggs, Canterbury; August 5th*, 1896.

## BOTANY

Pyrus japonica Fruiting.—My thanks are due to Mr. Lett for his information (*ante* p. 52) respecting the fruiting of this shrub in Ireland. As there has been no other case mentioned, it may be concluded that my friend's plant, without exactly making "a record" has sufficiently distinguished itself to deserve notice. He tells me that this year neither of his specimens has set any fruit. The *Ampelopsis* (S-G. vol. ii. p. 192) has again produced numbers of berries, which will no doubt ripen in due course, as they did last year; the unusually continuous fine weather of both summers probably accounting for the event.—*Jas. Burton*, 9, *Agamemnon Road, West Hampstead; August*, 1896.

Epping Forest Plants.—Of the plants recorded as growing in Epping Forest there are in existence several lists, the most recent, I believe, being that published by Mr. J. T. Powell, in the "Essex Naturalist," in 1892. A copy of this list having recently come into my possession, I note that the following two plants are not recorded, nor are they given in the list of Epping Forest plants in Buxton's "Epping Forest." They both probably have been seen by other observers than myself. *Stellaria umbrosa*, in the forest, near Chingford; *Limnanthemum peltatum*, pond south-west of Epping. The latter plant is given for Woodford (including the River Roding) in Cooper's "Flora Metropolitana," 1836, upon the authority of Warner.—*C. E. Britton*, 189, *Beresford Street, Camberwell, S.E.*

Plants on Disturbed Soil.—Whilst recently going by the bridle-path from Ashtead towards Headley, Surrey, I noticed towards the old Roman road, known as the Ermyn Way, a narrow strip of ground parallel to the path, from which the turf had been removed. There grew on this disturbed soil a number of plants altogether different in character from those that had been displaced by the removal of the turf, and also different from those growing beyond the bounds of the narrow strip. As a whole the plants were alien to the Downs and represented the weed-flora of the not distant cornfields, in which, however, the corn having been cut, rendered a comparison with the weeds not possible. The most showy plant was a beautiful large-flowered hemp-nettle that, with the poppies, made a fine display. The following is a list of the plants noted, and is incomplete, as it does not, at the least, include one or more grasses of the Downs: *Fumaria officinalis; Papaver somniferum, P. rhœas, P. lamottei, P. argemone; Reseda lutea; Viola arvensis; Silene cucubalus; Lychnis alba; Stellaria media; Arenaria serpyllifolia, A. leptoclados; Medicago lupalina; Trifolium medium; Potentilla anserina; Æthusa cynapium; Matricaria inodora; Centaurea scabiosa; Sonchus asper; Anagallis arvensis; Convolvulus arvensis; Linaria spuria, L. vulgaris, L. viscida; Veronica agrestis, V. buxbaumii; Calamintha arvensis; Galeopsis angustifolia; Ajuga chamœpitys; Plantago major; Chenopodium album; Atriplex angustifolia; Polygonum convolvulus, P. aviculare; Euphorbia exigua, E. helioscopia; Lolium perenne.*—*C. E. Britton*, 189, *Beresford Street, Camberwell, S.E.; August*, 1896.

# TRANSACTIONS

South London Entomological and Natural History Society.—August 13th. (*Continued from page* 111.) Mr. Fremlin exhibited a series of *Phigalia pedaria*, from Saltash, including the dark reticulated form and the very dark uniform variety. Mr. H. Moore, numerous interesting insects from South Africa, including a fine specimen of *Actias mimosæ*, which, from its sluggish habits, can be easily picked off the bushes, its larvæ are more or less gregarious; several species of the larger Orthoptera, including *Pachytilus pardalinus*, the species which often appears in vast numbers and does considerable damage; *P. peregrinus*, which is "the locust" of North Africa; *Cyrtacanthus purpurifera*, a very large species; *Acheta africana*, a mole cricket from Johannesburg, and numerous species of Coleoptera which are attracted in thousands to the electric lights in Pretoria. Mr. Sauzé, a specimen of *Cicada anglica*, one of three taken by Mr. Heasler in Surrey. Mr. Heasler had been attracted to some oak-trees by an unusual stridulation, and eventually succeeded in obtaining these three examples. Thus a doubt as to whether this species stridulates or not has been cleared up, there being no previous record of such. Mr. West, of Greenwich, a series of the local Hemiptera, *Eurygaster maura* from Folkestone. Mr. Mansbridge, a double cocoon of *Clisiocampa neustria*, from which, although the imagines had emerged from the pupa-cases, they had been unable to extricate themselves. When cut open there was only one cavity partially divided into two. Mr. Barrett exhibited four British specimens of *Plusia ni*, two belonging to Mr. Jeffries and two to Mr. Briggs, one of the former was captured in Surrey; also a fine var. of *Cleoceris viminalis* having the basal half of the fore-wings very dark in contrast to the very pale outer portion, and a remarkable form, *Agrotis exclamationis*, in which neither of the stigmata were developed, but the elbowed and basal lines were very distinct and perfect on the uniformly pale brown ground colour. A discussion took place on the season, with especial reference to *Colias edusa* and the means of migration of insects. Messrs. Stevens, McArthur, Adkin, Barrett, Mansbridge, Winkley and others taking part.—August 27th. Mr. R. South, F.E.S., President, in the Chair. Mr. Montgomery exhibited a beautiful xanthic example of *Epinephele tithonus* taken at Jevington on July 27th, all the usually black area being a rich dark fulvous. Mr. Auld the results of his this year's breeding of *Abraxas grossulariata*, in the neighbourhood of Lewisham. Mr. Adkin, a head of flower-buds of ivy with ova of *Cyaniris* (*Lycæna*) *argiolus*, *in situ*, and made some remarks upon the habits of the species. Mr. Manger, a specimen of *Eugonia* (*Vanessa*) *polychloros* taken on May 24th at Brockley. It was suggested that the larva fed on poplar, as no elm was in the neighbourhood. Mr. Moore, specimens of *Papilio daunus* and *P. cresphontis* from St. Augustines, Florida, also several specimens of the "walking-stick" insect, *Arnisomorpha briprestoides*, which, when seized, will spurt out a strong acid vapour from exceptionally large glands placed in the sides of the thorax. Mr. Mansbridge, a bred species of *Polia chi* from a dark female taken near Huddersfield; several examples were dark, having all the lines, bands and markings of var. *olivacea*, but without any trace of the olive-green shade of that variation. Mr. South, two specimens of *Caradrina ambigua* taken by Mr. Woodford, near Exmouth, in July this year; the specimens were unusually pale and glossy, no doubt, it was thought, due to its resting habit in that district. In answer to a question from Mr. Barrett, Mr. McArthur said that the larva of *Hadena adusta* spun its cocoon in the autumn but did not turn to pupa till the spring. He had repeatedly found them at the roots of moss. Mr. Auld reported that var. *nigrata* of *Limenitis sybilla* had been taken in some numbers this year. He also knew of a specimen of *Polyommatus icarus* having no vestige of spots on the underside, and a var. of *Dryas paphia* a pale border and a dark centre. Mr. Turner had taken the second brood of *Zonosoma annulata* in North Kent, and three specimens came to sugar. Mr. Adkin had spent a fortnight at Eastbourne, but had seen no *Colias edusa*. Mr. South's experience was the same. Mr. Mansbridge had heard that the species was to be taken on the East Coast. Mr. Tutt, during a month spent in South France, had seen but half-a-dozen, in fact it always appeared scarcer than *C. hyale* on the Continent. Mr. Tutt asked if there was any direct evidence that *Pyrameis cardui* hybernated as an imago. He had failed to find any authenticated record. In North Africa, Mr. Eaton had reported the larvæ as feeding during the winter. Mr. Barrett had seen imagines in late autumn and again in spring, but knew of no positive evidence of the imago of this species being found in winter. Mr. Fremlin communicated the following letter which he had received: "'Culverlands,' 147, Willesden Lane, N.W. Dear Sir, I can offer bred *X. conspicillaris* (Kent), for *P. smaragdaria*. I have them both set and unset, black pins. Can also offer a fine *V. antiopa* (white border). Yours truly, Thos. Humble Ralfe." Strong and pointed criticism of this letter ensued.—*Hy. J. Turner (Hon. Report Sec.).*

City of London Entomological and Natural History Society. — Tuesday, September 1st. Exhibits: Mr. Nicholson, a bred series of large females of *Ocneria dispar*, many of them having the subterminal line very strongly developed on all the wings; one specimen had the dot and V-shaped mark united. Mr. Tutt said that in Grenoble the females of this species were very large, while in the neighbouring Alps they were small. Mr Frost, *Apatura iris*, grey form of *Agrotis nigricans*, *Noctua dahlii*, *N. stigmatica*, *Aplecta occulta*, *Hydroecia nictitans*, and var. *paludis* and a specimen of *Agrotis puta* with left hind-wing perfect but much dwarfed; all these among many others were from the vicinity of Ipswich, where he had found that moths came to sugar from about 10 p.m. till 2 or 3 a.m.; butterflies were scarce, except *Cyaniris* (*Lycæna*) *argiolus*, which was unusually common. Dr. J. S. Sequeira, lepidoptera from the Isle of Wight, taken during the first three weeks in August, including one *Notodonta dictæa*, and one *Arctia fuliginosa* taken at light at Ryde; blue females and dwarfs of *Polyommatus icarus;* a pale brassy specimen of *Chrysophanus phlœas*, taken in the spot where he had captured an example of the var. *schmidtii* many years ago. Sugar had been a total failure. *C. argiolus* was very common. Mr. Nicholson said he had heard that if larvæ of *Arctia caia* were reared

on lettuce, they would pupate in the autumn and produce a second brood. Mr. Sequeira stated that part of a lot of silkworms' eggs, laid in July, had already hatched. Mr. Bate recorded a specimen of *Tethea sublusa* from Dulwich, August 26th last; he believed this species had not been taken in the district before. Mr. Tutt said it had been taken previously, but not commonly.—*C. Nicholson and L. J. Tremayne* (*Hon. Secs.*).

North London Natural History Society.—Thursday, July 23rd, 1896. Mr. C. B. Smith, President, in the chair. Exhibits: Mr. Harvey, *Geometra papilionaria*, reared from Epping Forest larva. Mr. Bishop mentioned that the bilberry grows near Sevenoaks, which he thought was the nearest locality to London for this plant. Mr. R. W. Robbins said he had been more or less commissioned by the society, at the last meeting, to find out the food-plant of *Papilio machaon* in the Alps. Having spent a week at Lucerne, he had found the wild carrot extremely plentiful at elevations as high as those whereon *P. machaon* occurred, and had no doubt this plant was the food of the larvæ. Mr. F. W. Rudler, F.G.S., Curator of the Museum of Practical Geology, Jermyn Street, read a most interesting and instructive paper entitled "The Age of Ice." Referring to our fossil remains, he said that in the Mollusca, most of the species still existed at the present day, but the Mammals were nearly all either locally or totally extinct. The appearance of many of these was hairy and shaggy, suggestive of an age of intense cold. Mr. Rudler then dealt at great length with the discovery of traces of ice drifts in Scotland and Wales, and mentioned the names of Agassiz, Venetz, de Charpentier, Buckland and Ramsay in connection therewith. He then explained very fully the use of ice as an agency for transport, and showed how bodies may be carried along, either in, on, or under the ice. This led to an explanation of many subjects, the whole illustrated by a splendid series of diagrams. The paper was admirably delivered throughout, and lasted one hour forty-five minutes. A hearty vote of thanks to Mr. Rudler terminated the proceedings.—*Lawrence J. Tremayne, Hon. Sec.*

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

Dora Twopenny.—Thanks for plums. Double specimens are not very rare. The smaller is an interrupted double one, one half not having matured.

R. M. Thorpe (Nottingham).—We sympathise with you on the comparatively limited number of short notes on microscopy in Science-Gossip. We always gladly welcome them. We fear the interest in the subject has been latterly overshadowed by athletics, bicycling and the like. We know of no other monthly journal which publishes them, and the quarterlies are too long apart. If more were sent in by those still working with the microscope the interest would soon revive. As you say, students now beginning, need recent notes to encourage them.

A. B. Jackson (Newbury).—Yes, the fungi sent are the edible champignon, *Marasmius oreado*, Fr., which forms the "fairy-rings."

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Pleistocene mollusca for exchange; desiderata, British and European shells.—A. S. Kennard, Benenden, Mackenzie Road, Beckenham, Kent.

Wanted, offers for Beck's Popular Binocular Microscope, 2-in., 1-in., ½ in., ⅙-in. objectives, etc., cost £19; would accept in part ½ plate camera outfit.—J. Read, St. Stephen's Street, Norwich.

Wanted, No. 14 "Naturalist's Journal."—Mosley, printer, Huddersfield.

Wanted, Science-Gossip for November, 1868, September to December, 1893, and September, 1889; any reasonable price given. Also wanted, specimens exhibiting mimicry in Lepidoptera, Orthoptera, etc.; full particulars for cash or exchange.—Mark Sykes, Manor Street, Ardwick, Manchester.

Butterflies exchanged for moths, Sibylla, Galathea, Adonis, Corydon, Alsus, Actæon.—F. Brown, Van Buren, Bournemouth.

Wanted, cabinet specimens of sea-urchins and star-fish, also a wasps' nest, in exchange for first-class micro-slides and good healthy canaries.—H. W. Parritt, 8, Whitehall Park, London, N.

Vertigo substriata, V. edentula, Zonites excavatus, Z. nitidus, Acmea lineata and others for Unios and Anodontas from any rivers or ponds in Norfolk.—Joseph Whitwham, 82, Cross Lane, Marsh, Huddersfield.

For exchange, a few dozen micro-photo negatives. Wanted, mounted Diatoms and Foraminifera.—John Mearns, 52, Jasmine Terrace, Aberdeen.

Wanted, specimen of paste containing live eels (Anguillulæ) in exchange for micro-slides; also for exchange, Fiddian's portable microscope lamp and Casella's altazimuth. Wanted, safety stage.—H. G. Madan, Bearland, Gloucester.

Fossil diatomaceous earth of Oamaru, New Zealand, for a similar weight of any other earth of similar character.—R. Trist Searell, Professor of Music, Christchurch, N.Z.

Wanted, Chemical balance (½ milligram), chemical apparatus, blowpipe apparatus, and rock specimens and slides. State desiderata.—J. Russon, 123, Monk's Road, Lincoln.

Mosses.—Wanted, Sphagnums, Bryums, and any Dicranaceae, Grimmiaceae. Offered, Hypnum imponens, Ephemerum minutissimum; Fruiting specimens: Aulacomnion palustre, Hypnum purum, Hylocomium squarrosum, Eurynchium piliferum.—H. Monington, 8, Westwood Road, Streatham.

# A MOTH NEW TO BRITAIN.

By John T. Carrington.

As stated in the last number of Science-Gossip (*ante* p. 131), I had the good fortune to capture a male example of *Calophasia platyptera*, Esp., on September 14th last; and have now the pleasure of giving a natural-size illustration of the specimen.

It is curious that although we have not the genus *Calophasia* in our last recognized lists of British lepidoptera, it was so named by an Englishman, the celebrated James Francis Stephens, one of the fathers of entomology. It appears in his "Illustrations of British Entomology" (vol. iii. Haustellata), published in 1829. He named it from the Greek words, Κάλον, lignum, and Φάσις, apparitio. Stephens introduced into the list of his period a moth named *linariæ* which he placed in his new genus *Calophasia*, from specimens captured in June, 1817, at Woodside, near Epping, Essex, and obtained whilst fresh by Dr. Leach, who, "with his wonted liberality, supplied me with the fine specimen," whence the drawing was made on his accompanying plate 29. Dr. Staudinger, in his "Catalogue of European Lepidoptera" makes *linariæ* a synonym for *Calophasia lunula*, Hufn., and Stephens' figure is much like other figures of *C. lunula*. Westwood and Humphry, in "British Moths and their Transformations" (vol. i., plate l., figs. 3, 4 and 12), illustrate *linariæ* and its larva, the moth appearing quite different to Stephens' figure, being much more like *C. platyptera*. These authors, however, apparently give *linariæ* as British on Stephens' authority. The latter author, in recording *linariæ*, says: "The only examples I have seen of this remarkably conspicuous insect are contained in the collection of the British Museum and in my own cabinet." I am of opinion that several *Calophasia lunula*, under the synonym of *linariæ*, were taken in 1817, as stated, but the species has not appeared in Britain since, and has therefore been omitted from the list of our lepidopterous fauna. The genus now re-appears as British, in my addition to our list of native lepidoptera.

Professor Ernst Hofman in "Die Gross-Schmetterdinge Europas," issued in 1894, figures both *Calophasia platyptera* and *C. lunula*; his figure of the former is not drawn from a specimen quite like the one taken by me and figured here, being much darker, though evidently of that species.

Dr. Staudinger, in his "Catalogue of European Butterflies and Moths," above referred to, enumerates eight species in *Calophasia*. He places the genus next but one before the genus *Cucullia*; *Cleophana* intervening with nine species. Therefore, in our British list of lepidoptera, as at present arranged, *Calophasia platyptera* comes between *Xylocampa lithoriza* and *Cucullia verbasci*.

The description of *C. platyptera*, as translated by Mr. Kirby in his "European Butterflies and Moths," runs as follows:—"Fore-wings ashy grey, with a brownish shade running from middle of the inner margin to the tip, and slender black nervures and intermediate black streaks in the marginal area, which are intersected by the pale suffused submarginal lines. The transverse lines and stigmata are absent; hind-wings brownish, paler towards the base. Expands 1 to 1¼ inches. It inhabits Southern Europe in June, and the larvæ resembles that of *lunula*. The moth flies over flowers in the evening in June, and the larva feeds on *Linaria nivea*." The larva of *C. lunula* is "pearly-white, with yellow longitudinal lines, black transverse spots on the back, and black spots on the sides; it feeds in June and August, being double-brooded." Some authorities give *platyptera* also as double-brooded.

Lesser Shark Moth.
*Calophasia platyptera*, Esp.

The exact locality where I took this interesting addition to our lepidoptera was in a rough hedge enclosing an uncultivated field devoted to gravel-pits and brick-making on the south side of the old Shoreham road, a little over three miles from Brighton. It may be reached by train to Portslade station, then take the road running thence northwards, turn sharp to left after proceeding a few hundred yards; the road then dips considerably down hill. There it will be found to have been artificially raised above the field on the south side and the bank-like hedge facing south is the place where I found the moth. Search should be made next year in late June and July, and again in September for this species, especially on rails, posts, palings, and by beating the hedgerow. The flowers should also be watched at dusk; in fact the members of the genus *Calophasia* possess habits similar to the larger "shark-moths." The toad flax and allied plants growing around should be searched for the larvæ.

The European range of this species extends, I believe, into Southern Germany, as its most northern limit. It may be suggested that it has been artificially introduced with cargoes from the Continent.

I doubt that theory, because any cargoes which are landed in the small port of Shoreham, in Sussex, are extremely unlikely to have come from Southern or Central Europe, where *C. platyptera* occurs, as they consist chiefly of coals, timber, potatoes and goods from our own and Continental ports not far distant. The harbour is so shallow at Shoreham that vessels of any great size could not enter. It will be remembered when the late William Prest took a specimen of *Eupithecia extensaria* near Hull, many persons, including himself, believed it to have been a stray specimen introduced from the Baltic region with some ship's ballast. So it remained for several years unique as British, no one troubling to search for the species. Now, thanks to Mr. Porritt, every lepidopterist in this country probably knows that *Eupithecia extensaria* occurs locally wherever the sea-wormwood grows, from Hull southwards, down to the Norfolk coast. This incident shows how unwise it is to take any statement for granted in connection with scientific investigation, and how necessary it is to verify every fact.

1, *Northumberland Avenue, London, W.C.;*
*October*, 1896.

## THE RISE OF PALÆONTOLOGY.

By Arthur J. Maslen.

HOW often does the student, after a few days' fossil-hunting, pause to consider, or even think of considering, in the midst of his chipping and trimming, his glueing and washing, the history of that important branch of science, palæontology, to which he may, perchance, contribute his mite? How engrossing, how sublime, how helpful, to read the lives of the great heroes who made our science. When we think of Smith, of Cuvier, of Lamarck, of Owen, and a host of other worthies, who each fought almost alone the battle which took us out of the misty realms of metaphysical speculation and landed us with infinite labour on our way to the certitudes of positive science; when we think of all this, and then contemplate the fact that the last hundred years include the whole of their lives, we feel that the progress of palæontology has been indeed great and rapid.

Looking back along the path of history into the dimmer regions of antiquity, we seek in vain for the name or place of him who first found, embedded in the very foundations as it were of the earth, a shell, a tooth, or a bone, and pondered over the causes which brought the thing into such a curious position. Entering the region of real knowledge, the antiquity of the study of fossils is attested by the fact that the great Herodotus himself describes the nummulites which make up the building-material of the pyramids of Egypt—then, more than now, the home of mystery—as the "remains of lentils." The Greek philosopher, Xenophanes, 500 years before the Christian era, was influenced in his lofty philosophical rhapsodies by his observations on the fossil remains exposed to his view in the quarries of Syracuse.

Notwithstanding the fact that since this early time fossils are occasionally mentioned by philosophers, geographers and others, and notwithstanding the many speculations respecting their origin and nature by the philosophers at the revival of learning, it was not until the present century that we came to what we may term a scientific knowledge of fossils—the work, as pioneers, of Cuvier, Lamarck and others. Indeed, the term "palæontology," the study of ancient life (in fact the study itself in the sense of the meaning of the word) is so entirely modern, that so far as is known, Pusch, in a work on the geology of Poland, published in 1837, first used it; and it was only made popular by the insistent use of the term by A. D'Orbigny about 1840.

In attempting to give a brief sketch of the history of palæontology, using the term in the sense of the study of fossils, it will be convenient to divide the time into four periods:

1st Period.—Aristotle (B.C. 300)—Leonardo da Vinci (A.D. 1500).

2nd Period.—Beginning of the 16th century—Linnæus (1766).

3rd Period.—Linnæus—Darwin (1859).

4th Period.—1859—present day.

During the long interval of time represented by the first period, the progress of science was indeed slow, if it was not rather retrogressive, for the healthy common sense of the ancient Greeks, of Xenophanes and Aristotle, had led them to assert without hesitation the organic nature of the fossils they saw. Again, towards the end of the period a few men, including Leonardo da Vinci and others, struggling to free themselves from the maze of metaphysical speculation and fancy which constituted the foundation of the natural knowledge of their time, were able to take just views of the nature of fossils and to claim for them, in spite of the school-men, their true nature as the remains of once-living animals and plants. To Aristotle indeed must be given the credit of being the founder of the inductive system of reasoning, which forms the basis on which modern science has been reared and which was almost lost in the darkness of the *a priori* reasoning of the middle ages.

It is said that Alexander (afterwards Alexander the Great), a pupil of Aristotle, was so interested in the natural history studies of his tutor, that he employed a host of men in collecting natural curiosities, which afterwards formed the materials for the work of his master on the "History of Animals." This point is particularly interesting as tending to show us that Aristotle was not content with merely reasoning about things, but he must see and handle. Indeed, so antagonistic are some of his principles from those of Plato that whilst the key-note of the latter seems to be that ideas alone determine our knowledge, and that consequently we must distrust all sensations not in accordance with those *a priori* ideas, Aristotle goes so far as to say that a sensation must be true, although our interpretation may be, and often is, erroneous. He points out that observation is more to be trusted than pure reason, and that we must not accept general principles from reason only, but must start with facts, and then test the general laws we promulgate by the accuracy of the deductions we make from them. With Aristotle we reach the culminating point of ancient philosophy, and we can hardly doubt that had not the principles given above been submerged later by the subtle speculations of the school-men, science would have progressed much more rapidly than has been the case

The first names of fossils, as far as is known, are due to Theofrastus, another pupil of Aristotle, and Pliny, nearly 300 years later, gave us the familiar names Ammonites (the horns of Jupiter Ammon), Spongites, etc. It must be remembered, however, that these names were not applied in the definite and limited sense in which we now use them, the name Spongites, for example, now restricted to the fresh-water sponge, being then applied to almost any indeterminate markings.

We have seen how, after this, inductive science was brought almost to a standstill and *a priori* reasoning alone cultivated. Speculation became rife as to what fossils were. Belief in spontaneous generation (abiogenesis), that is to say, in the development of living matter out of mineral matter, was universal, and the prevailing idea was that fossils are generated in the earth. And why not? Just as certain things are formed in the sea and different things in the air, why should not certain things be formed in the earth? And why should they not, thought these old masters, have the form of animals or plants? And did they not see in the fern-like growth of the hoar-frost, as it crept o'er the window-pane in winter, proof that there are forces acting capable of making inorganic matter take up organic forms. What wonder then that people preferred to believe that fossils were mere sports of nature than that they were really what they are; for would it not have necessitated belief in the fluctuation of the relative level of land and sea? How impossible this must have seemed. How much more reasonable to accept the former view rather than the latter. Let us ever remember that these old philosophers' thoughts were necessarily moulded to a very considerable extent by the intellectual environment of their time, just exactly as ours are, and that their opinions, though erroneous to us, are yet entitled to our respect; and let us re-echo with Vanini: "The grace of God forbid we should be over-bold to lay rough hands on any man's opinion. For opinions are certes, venerable properties, and those which show the most decrepitude should have the gentlest handling."

The second of our periods — that from the beginning of the sixteenth century—presents no very sharp line of demarcation from the preceding one. Metaphysical speculation still held almost undisputed sway; indeed, it may be said that the *a priori* method really culminated in Linnæus, who was essentially a school-man, and did not think that fossils were the remains of living organisms. However, be this as it may, opinion was beginning to change. Thinkers were no longer content to receive unquestioned the speculations of their ancestors. No longer was everyone content to look upon fossils as mere sports of nature, mere creative attempts, mere failure in the history of creation. The prevailing idea was that they were remains left by the Deluge. How many books were published in confirmation of this? We can imagine the interest evinced when Schewchzer published his works on the animals of the period of the Deluge. How interesting the account given of the remains of the ill-fated animals and even men. Alas, so uncritical were their methods that it was left to the future to point out that the so-called skeleton of a man was really but a salamander, and that the bones of the accursed race were merely the now familiar Liassic *Ichthyosaurus* vertebræ. One of the most remarkable men of this period was Dr. John Woodward, the founder of the museum bearing his name at Cambridge. His chief work was entitled "An Attempt Towards a Natural History of the Fossils of England," published in 1729. This book, published after the author's death, contains an introduction by the publisher, in which he quaintly remarks: "He succeeded, indeed, but it was not without having carried it on for a course of nearly forty years, with a passion for the improvement of natural knowledge in general, and with a particular view to evince the universality of the Deluge." Glancing through this book, one sees the very wide sense in which the term "fossil" was then used; for it includes minerals, metals, gems, flint-implements, etc. So overwhelmed at the cumulating evidence in favour of the Deluge was Voltaire that

he had to argue that fossils were really shells thrown away and left by the pilgrims to the Holy Land.

As a bright star shines out in a temporary break in the thick-set clouds, and beams down none the less brightly because of its temporary eclipse, so Nicholas Steno appears in the darkness of his times. Born at Copenhagen, he became Professor of Anatomy at Florence, and in 1669, published a little treatise with the title of "De Solido intra Solidum Naturaliter contento," in which he treats of the general principles of the interpretation of fossils. He gave us really definitely, for the first time, the scientific grounds on which this interpretation must be based, accepting as he did the axiom that "like effects imply like causes." Is not this axiom—so simple yet so important—the guiding principle in all science, and is it not this which alone renders the reading of "Nature's infinite book of secrecy" possible? What were Steno's methods? Long before his time collectors were puzzled and speculation was rife as to what were certain bodies which they called "glossopetræ." Attempts had been made to convince people that these were really sharks' teeth, but all to no avail until Steno re-opened the question and proved to demonstration their true nature. And how did he do this? By the simple method of dissecting a shark's head and showing the similarity between the teeth and their glossopetræ. He did what so many philosophers of his time disdained to do: he went to Nature herself. Steno's settlement of this question at once led to the discussion of the uses of fossils in tracing out the past history of the earth, which was as ably followed out afterwards by William Smith. Steno discusses the subject in a masterly manner, taking as his example a portion of Tuscany, and his methods are followed closely by Buffon in his two remarkable works, the "Théorie de la Terre" and the "Époques de la Nature," in which he points out clearly the teaching of fossils as to different climatic conditions at past periods, plant and animal extinction and other topics. This brings us to Linnæus, with whom we close our second period.

*(To be continued.)*

Fasciated Atriplex.—Enclosed is part of a fasciated stem of *Atriplex patula* found on a piece of waste ground near here. The whole stem was about two and a-half feet long. The top presented a very curious appearance, owing to the small racemes of flowers growing out of the flat main stem.—*J. E. Cooper*, 93, *Southwood Lane*, *Highgate*, *N.; September 1st*, 1896.

Lepidium ruderale in Berks.—I recently found a good quantity of *Lepidium ruderale*, L., growing on a piece of waste ground near the Newbury Corn Wharf. Although the plant is evidently of casual occurrence here, I think it is worth a note as there are but few records of it for the county.—*A. B. Jackson, Mapledene, Enborne Road, Newbury.*

## ESSEX COUNCIL BIOLOGICAL STATION.

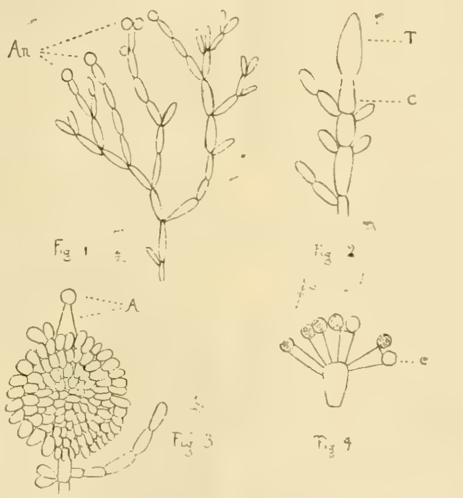
During the past summer session of the Marine Biological Station at Brightlingsea in Essex, the laboratory records show that the students made 385 attendances over and above the ordinary class attendance. The preservation of the animals of the Estuary of the Colne is proceeding, and a typical collection is being formed for reference. We further find from the annual report of Mr. David Houston that the work at the laboratory is divided into three sections, viz.: (1) Systematic Laboratory Teaching; (2) Short Demonstrations to Occasional Visitors; (3) Experimental and Consultative Work.

Brightlingsea being adjacent to the great oyster-beds of the Essex coast, the life history of those esculent molluscs formed a never-failing attraction for the casual visitors to the laboratory. Mr. William Bagley, the resident assistant, gave daily demonstrations on this subject, and on other marine animals, to the visitors, whose attendance exceeded 750. These persons included all classes, fishermen, dredgermen, oyster merchants, townspeople, yachtsmen, ordinary visitors to the sea-side, journalists and students from London and elsewhere. The success of the experiment of founding a biological station on the Essex coast has been so great that efforts are to be made to secure larger and better premises before next season. This is not a source of surprise when we consider that Brightlingsea is only about a couple of hours' railway journey from London, so that students may avail themselves of one of the daily excursions at cheap fares, have a good day's work, and return the same evening. Although the Essex coast has not the magnificent rock-pools which are found near Plymouth, there is abundant material at hand for serious workers at Brightlingsea. We feel sure that if continued effort is made by the local committee of management, sufficient attraction can be created to make this, at present, little station one of importance in the future. The Essex County Council is to be congratulated on its admirable foresight in establishing this and other branches of biological educational work, so ably carried on in the county under the supervision of Mr. Houston, the staff-biologist. A winter course on Gardening, for youths who intend to become gardeners, commences in the first week in November. Selected candidates are to be allowed railway fare and a grant towards maintenance while attending the course at Chelmsford. The organ of the department, which is published at the County Technical Laboratories, Chelmsford, shows how earnestly the work is carried on. It is the "Journal of the Essex Technical Laboratories," and is issued monthly at threepence per copy.

# A FRESHWATER ALGA.

By C. E. Britton.

MICROSCOPISTS, more especially those who do not neglect micro-botany, are familiar with the most frequent representative of the Florideæ, or red "seaweeds," that grow in fresh-water, namely *Batrachospermum*. Yet, as a rule, all observation of the plant is confined to a superficial examination under a low power of the microscope, and ends there. Whereas *Batrachospermum*, being a good type of the red seaweeds, well repays a little extra trouble devoted to its study, and it does not require very skilful manipulation to see the chief points in its structure, including the apical cell and male and female organs. There are but few good accounts in English of this alga. One of the most accessible is that contained in Smithson's "Algæ," in the "Young Collector" Series; yet the process of fertilization described therein as occurring in *Batrachospermum* is erroneous in many points when looked at in the light of recent researches. An opinion prevails, I believe, that this alga is rare. It may not be common, but it is usually to be found in likely situations, such as wells, springs and streams containing much spring water. In ponds and streams not spring-fed it is certainly rarer. When growing the plant has the appearance of consisting of short tufts of filaments attached to stones, etc. Its most usual tint is blackish, though the colour is said to range from green, violet, brown to black. Sometimes, when growing under certain conditions, the plant is almost blanched, very little colouring-matter being developed. This form is most suitable for studying the structure of the plant, and the next best are green and blue-green forms. The surface of the plant is covered by a jelly-like substance, and when gathering the plant, while it is easy to detach it from its place of growth, on attempting to remove it from the water it has a way of slipping back through one's fingers. Owing to this slimy nature the plant derives its generic name of *Batrachospermum*, besides which it possesses two English names which are evidently the invention of writers: one being "frog-spawn," a literal translation of the scientific name, the other, "bead-moss," a very inaccurate designation. If an English name is required, I would suggest *beadwort*. It is easy to see why the name "bead-moss" has been bestowed on the plant, for if we examine a plant, preferably with a pocket-lens, we shall notice that it appears to be made up of small dark beads suspended closely together on very fine threads. On the older parts the beads have a squarish or roundish outline and stand apart from each other, and on the younger tapering parts of the branches are more disc-shaped and placed closer together, until near the extremities the bead-like arrangement ceases. Embedded in many of the bead-like parts may perhaps be noticed small grains of a darker colour, the fruit-bodies or cystocarps. It is very important to notice these, as they give rise to the cells that reproduce the plant, and these latter reproductive cells are the only means of increase that, as far as is known, the mature plant bears.




Freshwater Alga (*Batrachospermum*).
Fig. 1, Portion of leaf with antheridia, An. Fig. 2, Procarp; T, trichogyne; C, carpogone. Fig. 3, Cystocarp; A, trichogyne and spermatium.

For the further study of the alga the use of the compound microscope is necessary, making use first of all of a low power, and then it will be seen that in addition to being one of the most interesting of the freshwater algæ, *Batrachospermum* is one of the prettiest. Under a power, such as a one-inch, the bead-like appearance will be noticed as due to tufts of filaments that arise at intervals in

circles round the stem, and, in the older parts, spread in all directions, whilst in the younger parts the filaments are disposed more or less horizontally. The filaments are much branched, and are formed of cells either cylindrical or narrowly barrel-shaped. Towards the circumference of the tufts may be roundish bodies, darker in colour and formed of short cells. These are the fruit-bodies or cystocarps. The further structure may best be seen if a small plant or a portion of a larger one is mounted on a slide and crushed by steady pressure on the cover-slip. Using a high-power, $\frac{1}{6}$-inch, for instance, the stem is seen made up of longitudinal rows of cells of two forms. In the centre the cells are very large and form a single row, and around these are a number of rows of shorter, much narrower, cells, constituting a covering or kind of cortex to the larger central cells. The stems and branches do not at first possess this cortex, which is only formed on them as they increase in age. The way in which the cortex is formed is rather curious, and is very similar to the origin of the cortex in *Chara*. The cortex of *Chara* is formed by branches arising from the lower parts of the leaves and growing upwards and downwards, uniting with similar growths above and below, to form a covering around the long central cells. The formation of the cortex of *Batrachospermum* differs only to the extent that the out-growths from the lower parts of the leaves proceed in one direction, from above, downwards. Tracing the stem upwards, all stages in the formation of this cortex may be seen: the lower segments with a complete investment, above these segments around which the down-growing filaments have not yet united, and higher up segments with but the rudiments of the investments.

If the cells of the stem are traced upwards, their length is seen to gradually lessen, and finally they become disc-shaped, terminating in a cell slightly longer and with a rounded free extremity. This is the apical cell, by means of which, division occurring at the lower end, elongation of the stem takes place. Sometimes the apical cell is obscured by the surrounding filaments, and then an extremity of one of these may be taken for it, but it can usually be found by tracing up the stem and careful focussing. In tracing np the stem there will be noticed lateral growing-points repeating the structure of the main axis, and the origin of the tufts of filaments, leaves as they may be called, arising from short cells given off from the upper extremities of the large stem-cells.

Should an entire plant be under view that has carefully been removed from the surface on which it grew, the root should be noticed, consisting of long narrow rows of cells. These filaments, unlike the other cells of the plant, do not possess colouring-matter. They spread on the surface of the stones, etc., attaching the plant to these.

The sexual organs should now be studied. A plant may bear male organs (antheridia) only, or female organs (procarps) only. In the latter case it usually happens that when bearing ripe fruit or cystocarps they will also bear antheridia in addition. It is very difficult to get a view of a procarp before it has been fertilized. After fertilization it undergoes a process of growth that renders it easily recognizable. A procarp is formed from the terminal cells of a branch of a leaf. It consists of two parts, each with a different function. A larger, more conspicuous part, the trichogyne, with which the male fertilizing cell becomes united, and below this, separated by a constriction, a smaller part, the carpogone. It is hardly likely that a procarp will at once be identified, but if attention is given to cystocarps in various stages of development, proceeding from the more to the lesser developed, the trichogynes will be seen as club-shaped or spindle-shaped organs projecting from the latter. The rounded body at the extremity is not a part of the trichogyne, but is a male fertilizing cell that has become fused with the trichogyne. The male organs, antheridia, are roundish cells produced at the extremites of branches of the leaves. They are borne singly or two together upon the supporting cell, and, besides their shape, are distinguished by the light colour of their contents. For the purpose of effecting fertilization, the protoplasm, or contents of each antheridium, becomes liberated into the surrounding water. It is now a spermatium or male fertilizing cell. It does not possess a coating of cellulose, and is unprovided with any means of propulsion through the water. Between the times of being set free and of coming into contact with a trichogyne, each spermatium forms around itself a firm coating of cellulose. When it comes into contact with a trichogyne, it becomes firmly attached to this. At first the surfaces that are applied to each other are but small, but, apparently, the male cell becomes compressed to an extent and drawn down on the trichogyne. After a time the spermatium puts out a very short broad tube that penetrates the wall of the trichogyne, and the portion of cell-wall in contact with the tube disappears. There is now an open channel between the male cell and the trichogyne, the width of which varies, being greater or smaller. It is often the case that more than one spermatium becomes applied to a trichogyne, and then the most frequent numbers are two or three, though as many as seven spermatia may attach to one trichogyne. In these cases of more than one spermatium becoming attached to a trichogyne, the usual position of the cells is as follows: one male cell occupies the extreme apex, and the others are disposed on the

sides. Sometimes two male cells share the apex, and sometimes it occurs that a male cell becomes applied, not to the trichogyne, but to a male cell which is already seated there. In all cases of more than one male cell becoming attached to a trichogyne, it is said that only one forms an open channel with the trichogyne, the others having no function. It might be inferred that, as an opening exists between the spermatium and the trichogyne, the protoplasm, or the nucleus of the former organ, passes over into the latter to effect fertilization. However, recent observations seem to indicate that it is a matter of indifference whether the nucleus or any portion of protoplasm enters the trichogyne.

Indeed, the process of fertilization is so peculiar in *Batrachospermum*, that it is a matter of opinion whether it is a true sexual action or not. In the first place, no oosphere or female cell is formed from the protoplasm of the carpogone; secondly, if the nucleus of the spermatium enters the trichogyne it is said to remain in the upper part, and does not unite with the nucleus of the trichogyne or the nucleus of the carpogone. It even occurs occasionally that protoplasm and nucleus of the trichogyne will pass over into the male cell. Following closely upon the appearance of the opening between the male cell and the trichogyne, a deposition of cellulose takes place inside the procarp, gradually separating the trichogyne from the carpogone. This separation may be perfect, or it may be of such a character that a narrow cavity exists, in which, however, no protoplasm remains. Short protuberances are now given out from the carpogone, and, growing in length, become divided into short cells. The filaments branch, and the carpogone becomes hidden by these, which radiate on all sides. This growing body is the developing fruit or cystocarp, and the only part of the procarp which remains visible is the trichogyne, with attached spermatia. The trichogyne does not wither away, but remains persistent. Some of the filaments growing from the carpagone constitute an investment, or loose covering, to the cystocarp; others are fertile, and terminate in rounded cells, carposporangia, that each contain a single propagative body, known as a carpospore.

A carpospore does not develop into a *Batrachospermum* plant, but into a plant totally different. A carpospore gives origin to a kind of crustaceous pellicle covering the surfaces of stones, etc. It is composed of irregular filaments, sometimes united into globular masses. In the perennial species of *Batrachospermum* it is this structure which enables the plants to persist. It is capable of growth and reproduction, increasing at the circumference, and reproducing itself by spores. From this peculiar structure arise broad tufts of filaments, each consisting of a row of cells, and producing spores similar to those of the plant on which the tufts arise. Since this form can reproduce itself through a number of generations, it has long been regarded as a distinct genus, under the name of *Chantransia*. The freshwater species of *Chantransia* live on the most shaded sides of wells, etc., developing chiefly in darkness, whilst the *Batrachospermum* form seeks the light. Portions of the *Chantransia* form, undergoing differences in cell division, grow into the perfect *Batrachospermum* plant, which, producing roots, becomes independent.

This account of *Batrachospermum*, incomplete as it is, would be more so if no mention was made of the following. The American botanist, to whom we owe the latest information on the subject of the fertilization of this alga, set himself to answer the following. Seeing there is no union of the protoplasm of the male cell with that of the female organ, was it necessary for the production of fruit that a male cell should unite with the trichogyne? And he found this was necessary, for, when he grew, under their natural conditions, female plants isolated from male plants, so that the male cells could not come into contact with the trichogynes, the procarps or female organs did not develop into fruit.

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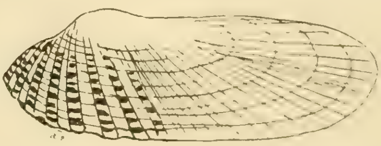
## THE NEW BRITISH MOLLUSC.

By J. E. Cooper.

*PETRICOLA pholadiformis*, Lawk, is a native of North America, it ranges from Prince Edward's Isle to St. Thomas. In this country it appears to have been first noticed by Mr. Walter Crouch, F.Z.S., at Burnham-on-Crouch, about four years ago. The first specimen found was a dead shell, but Mr. Crouch has since obtained living examples at the same place. In the spring of this year Mr. A. S. Kennard found this species alive



*Petricola pholadiformis*, Lawk.

near Herne Bay, and the writer picked up several dead specimens on the shore near Sandwich. It thus appears to be established in both the River Crouch and the Thames estuary. How it got there in the first instance is not certain, though probably it was introduced with American oysters. This *Petricola* bears a very striking external resemblance to the common *Pholas candida*, and may have been passed over by collectors mistaking it for that species.

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# STRUCTURAL FEATURES IN AMERICAN ROTIFERA.

By Dr. Alfred C. Stokes.

(*Continued from page* 122.)

Taphrocampa selenura, Gosse.

THIS interesting larviform creature is not common in my vicinity, but from a single shallow pool near my home it has been taken sparingly, the locality having, perhaps, supplied me with half-a-dozen specimens, over which I have observed a few structural points which appear not hitherto to have been noticed. The rotiferon is an untidy animal, its cuticular surface always being more or less defiled by adherent particles of various kinds, while the creature itself has a fondness for rooting among dead matter, and for eating even the excrement of worms and of aquatic snails.

Gosse says nothing about the antennæ; I assume, therefore, that he failed to see them. Still, in all his descriptions, he almost systematically omits references to these organs, which should have been included in every diagnosis, even at the risk of repetition and of a loss of rhetorical grace. No one would voluntarily go to a technical monograph with the expectation of meeting with the beauties of rhetoric, nor with quotations from Latin poetry, nor with a supply of "elegant extracts." Space occupied by literary graces would better be filled with complete descriptions of the objects treated.

It may be that the American forms of *Taphrocampa* are varieties of the European, with the antennæ and the frontal cilia well developed, while in the British specimens these parts are obscure. In my specimens of *T. selenura*, there are two dorsal antennæ at the front, each a setigerous, truncated lobule, while the lateral ones are minute papillæ, elongated and setigerous. The frontal cilia are short and fine, but well developed, filling an entirely prone, obovate field, about one-fifth the length of the body. They are visible only in lateral or in ventral view. The brain is not entirely opaque, the opacity being confined to a granular mass in the posterior region, yet there is reason to believe that the opacity increases, or at least changes, with the age of the animal.

The œsophagus is long and conspicuous, and an ovoid gastric gland is adherent to each frontal shoulder of the stomach. Within the stomach and across the entrance of the œsophagus is again the membraniform but really tubular organ so often referred to in other American rotifera, it being here, as elsewhere, an actual prolongation of the œsophagus. Its undulations are constant, but when food is passing through the œsophagus the movements become bewilderingly rapid, especially so as the observer has to contend with the constant writhings of the animal itself, such conditions making it impossible to decide positively that the food particles do pass through this tube, although they may be flowing into the stomach in a steady stream. Does this internal appendage exist with *Taphrocampa saudersiæ*, Gosse, and with *T. annulosa*, Gosse? These species have been taken in this country only in the State of Michigan, by Mr. H. S. Jennings, who gives no notes of their structure. If it is present in *T. clavigera* (1) I failed to notice it. Neither were the lateral antennæ seen on that species, although they must be present.

The entire alimentary canal of *T. selenura* is ciliated. When the posterior region is empty, the organ is a continuous, uninterrupted tube. But when the posterior portion contains excrementitious matters, a constriction occludes the lumen, thus temporarily dividing the tube into two subequal parts functionally distinct. The contractile vesicle is single, comparatively large, and ventrad to the intestine near the posterior extremity. Several flame-cells are visible on each side of the alimentary canal. Auricles are present, but seldom protruded. In the few instances in which I have seen them, they appeared to be cup-shaped, the cilia lining the concavity and the margins; but they may not have been fully expanded, as the animals were not then in a comfortable situation.

Philodina aculeata, Ehr.

The American specimens which I have seen are not nearly so deeply coloured as shown in Gosse's figure, but are, as a rule, only faintly tinged with brown. The body is densely and finely papillose, a feature not mentioned in the diagnosis of the genus, and therefore presumably not present with European forms. The frontal column is ciliated as described, but it also bears a small cucullate appendage at the tip, this little hood overhanging and partly surrounding the cilia. The species is not uncommon in this part of New Jersey, where I have captured it during the summer, and taken it from under the ice in February.

Philodina citrina, Ehr.

The body of the European form is said to be smooth; the American species are minutely papillose, and almost as conspicuously fluted as is *Rotifer vulgaris*.

Scaridium longicaudum, Ehr.

Gosse's statement that the eyes are permanently

(1) Ann. and Mag. Nat. Hist., July, 1896.

attached to the mastax is correct. The eye moves with the mastax, and seems to have no connection whatever with the cerebral ganglion.

MONOSTYLA QUADRIDENTATA, Ehr.

This species, or its American variety, occurs here, but is not common. I have never captured it until during the present summer (1896), and then not more than half a dozen specimens. It agrees well with the British form as described, but it also possesses the undulating tube within the stomach and continuous with the œsophagus, which was not noticed by Gosse, nor recorded by other observers, but which I have learned to expect and to look for in American Rotifera of a certain character. On the dorsal surface of the toe is a minute conical papilla, placed so close to the distal border of the single-jointed foot that it barely projects beyond the margin. In some specimens I have thought that I could observe minute setæ at its tip, but this is by no means certain. The contractile vesicle is large, elongate-ovoid, and placed parallel with the median line on the right-hand side. The lorica is rather coarsely punctate.

PTERODINA PATINA, Ehr.

Gosse says in his generic description, "I have failed to find any dorsal antenna." In the American form the dorsal antenna is a single, minute papilla, with an obscurely developed cluster of setæ, and situated in the median line at about one-third the length of the lorica from the front, being nearly in a direct line with the two rather conspicuous lateral antennæ. It is seated above a liguliform lobe of the cerebral ganglion, and shows a conspicuous rocket-shaped nerve thread, but whether or not this thread is above or within the ganglionic lobe is not easily determined, although it is probably above it.

These are all minute anatomical points, but insignificant and unimportant as they may seem to the general reader, yet they are of value and of great interest to the microscopical student. I publish them here rather than in my country, in the hope that the microscopical readers of SCIENCE-GOSSIP may have these British species so favourably placed that they may be able to decide whether or not the animals possess the same peculiarities as the American forms, or whether climate, environment or some unsuspected cause has made these American Rotifera to vary from those bearing the same name in Europe. But it seems hardly possible that the undulating stomachal tube should be so conspicuously developed in these American Rotifera and entirely absent from the British. This alone is an anatomical feature worth examining, and its presence or absence worth deciding.

*Trenton, New Jersey, U.S.A.;*
*September 1st, 1896.*

## THE THANET SANDS.

I THANK Mr. Barham for his remarks in the October number of SCIENCE-GOSSIP (*ante* p. 129), and have been much interested in them. He rightly says Bishopstone Dell, near Herne Bay, runs back less than a quarter of a mile inland. The gully, also, is about fifty feet deep. Its base is the same as sea-level at high tide. A coast-guard tells me that in rainy weather there is a small stream flowing at the base of the gully. Although with so short a length, it even now apparently has a watershed. Mr. Barham says, "It is fairly proved that the land has been eaten by the sea." Where is there proof? He says he has been compelled to theorise about an actual sinking of the land hereabouts. But why? He does not say. The Whitstable "Street," to which I made no reference, I grant is possibly formed as stated by Mr. Barham, and his remarks about it were of a very interesting nature. It bears a resemblance in its formation to the far-famed Chesil Beach. In concluding, Mr. Barham refers me to the little stream at Hampton, but, as it seems to me, only to support my point. Now, as he says, this is a little stream with an old bed nearly a quarter of a mile wide. But why this former great width and the present tiny stream? A stream can silt itself up to a certain point, but it cannot extinguish itself over a width of the greater part of a quarter of a mile. There must be something to assist it. What is it? I suggest it must be a rising land, which has moved the drainage in another direction. Still, there is all the difference between Bishopstone Dell, where the occasional stream flows at the bottom of a gully fifty feet deep, and where the Thanet sand-cliffs are visible almost to the bottom of the gully, little or no alluvium being present, and the stream at Hampton, where the Eocene formations are hidden by a thickness of alluvium, or river-drift, where there are no cliffs to speak of, and the whole district is but a few inches above the level of the sea at high water.

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"CAMBRIDGE NATURAL HISTORY." — Messrs. Macmillan and Co., of Bedford Street, London, announce that the next volume of the "Cambridge Natural History" will be issued in a few weeks. It will be upon various kinds of worms, and will give an impetus to that little-worked group of animals. The new volume will be vol. ii. of the series. The subjects and names of authors are to be as follows: Flatworms, by F. W. Gamble, M.Sc. Vict., Owens College; Nemertines, by Miss L. Sheldon, Newnham College, Cambridge; Thread-worms, &c., by A. E. Shipley, M.A., of Christ's College, Cambridge; Rotifers, by Marcus M. Hartog, M.A., Trinity College, Cambridge, D.Sc. Lond., Professor of Natural History in the Queen's College, Cork.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

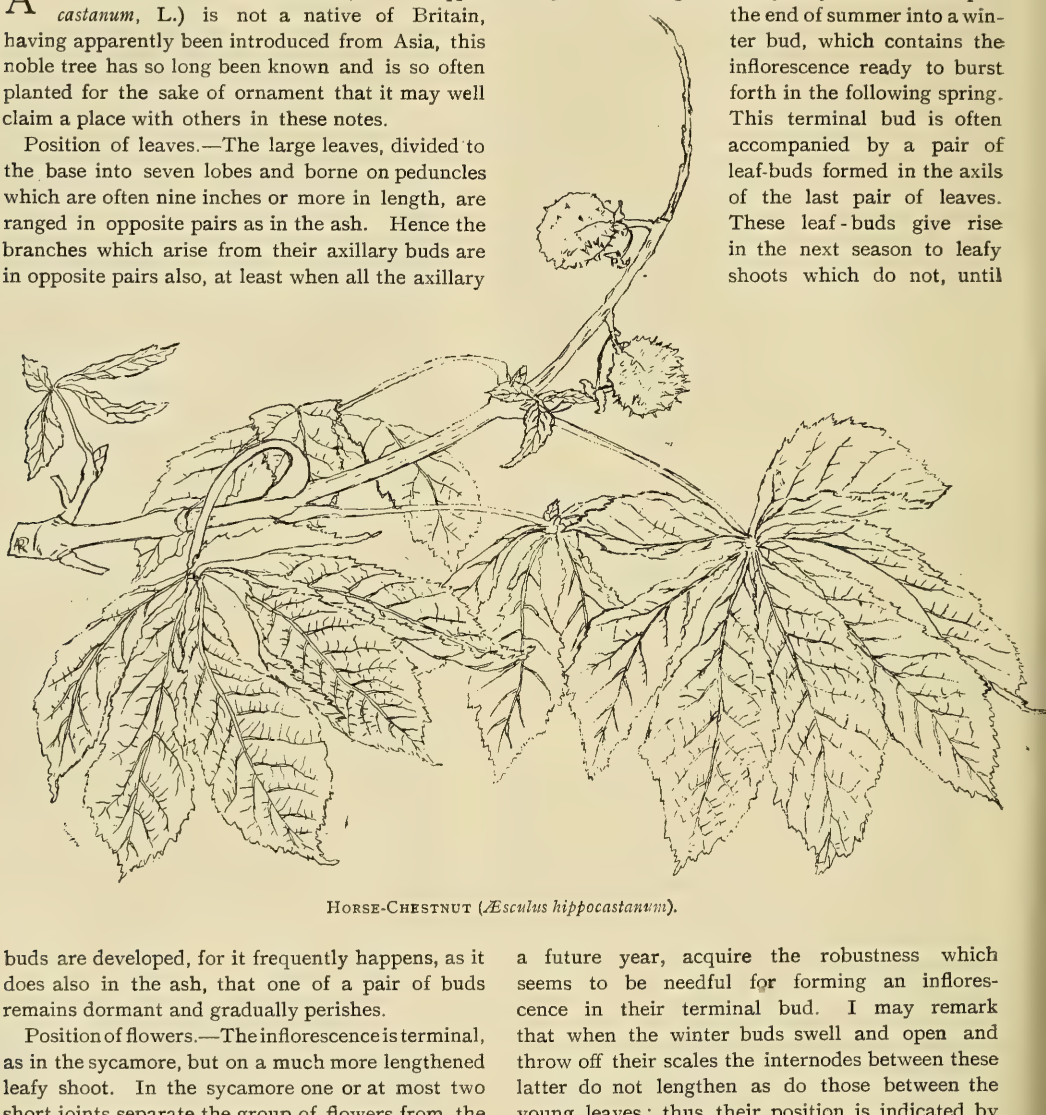
By the Rev. W. H. Purchas.

(*Continued from page* 95.)

## The Horse-Chestnut.

ALTHOUGH the horse-chestnut (*Æsculus hippocastanum*, L.) is not a native of Britain, having apparently been introduced from Asia, this noble tree has so long been known and is so often planted for the sake of ornament that it may well claim a place with others in these notes.

Position of leaves.—The large leaves, divided to the base into seven lobes and borne on peduncles which are often nine inches or more in length, are ranged in opposite pairs as in the ash. Hence the branches which arise from their axillary buds are in opposite pairs also, at least when all the axillary buds are developed, for it frequently happens, as it does also in the ash, that one of a pair of buds remains dormant and gradually perishes.



Horse-Chestnut (*Æsculus hippocastanum*).

Position of flowers.—The inflorescence is terminal, as in the sycamore, but on a much more lengthened leafy shoot. In the sycamore one or at most two short joints separate the group of flowers from the end of the last year's wood, while in the horse-chestnut a shoot of at least three joints intervenes. Some of these joints are as much as three or four inches long; thus the whole yearly growth, including the panicle or thyrse of flowers, will sometimes reach a length of eighteen or twenty inches.

Length of joints or internodes.—The yearly shoot seems to be completed more rapidly than in most trees. It consists of few (three or more) but long internodes, varying from one to several inches in length. The larger of the yearly shoots close up at the end of summer into a winter bud, which contains the inflorescence ready to burst forth in the following spring. This terminal bud is often accompanied by a pair of leaf-buds formed in the axils of the last pair of leaves. These leaf-buds give rise in the next season to leafy shoots which do not, until a future year, acquire the robustness which seems to be needful for forming an inflorescence in their terminal bud. I may remark that when the winter buds swell and open and throw off their scales the internodes between these latter do not lengthen as do those between the young leaves; thus their position is indicated by a little band of scars, and such bands of scars point out the starting-point of each season's growth.

Angle made with the main stem or branch.—The angle at which the lesser branches leave their parent branch is less than half a right-angle; thus the pair of branchlets which are developed from the buds formed in the axils of the pair of leaves nearest to the inflorescence do not start off

at a wide angle as in the sycamore, but take a more parallel line of growth, thus affecting materially the general features of the tree. The yearly shoots are unusually thick, even more so than in the ash, and hence they have a degree of stiffness of appearance, especially in winter. Whilst young, they take an upward direction, but as one year's growth is added to another the branch is bent downward by the weight, and only the younger sprays are able to maintain their ascending tendency.

The beauty of the horse-chestnut in its flowering state is familiar to all, as is its wealth of rich foliage. No hardy tree of equal size can at all compare with it as regards display of floral beauty, but its foliage when it has lost the freshness of early growth and the delicacy and warmth of its spring tint, is apt to seem dull and heavy, the leaves having with the advancing season increased greatly in size so as to overlap each other and prevent the varied effects of light and shadow, which give such a charm to trees where the extremities of the branches are more separated, and, as Gilpin expresses it, "hang with a degree of looseness from the fulness of the foliage which occupies the middle of the tree." As, however, the horse-chestnut advances in age, this defect becomes less and less apparent, through the increasing weight and length of the branches, which leads to their hanging more loosely from each other, and thus giving more freedom to the play of light and shadow.

*(To be continued.)*

HORSE-CHESTNUT. Autumn State. Showing Winter Buds.

## NORFOLK NATURALISTS.

A MEETING of the Norfolk and Norwich Naturalists' Society was held in the Castle Museum, on September 29th, the President (Sir F. G. M. Boileau, Bart.) in the chair. Mr. J. H. Gurney contributed some notes on resemblance in species, remarking that among birds there is an undoubted tendency to vary not infrequently in plumage, so as to resemble other allied species which inhabit a different geographical area. This tendency will now and then furnish a key to the supposed appearances of birds in a country remote from their own, for it may be surmised that such are not invariably the exotic stragglers which their colours lead them to be considered. A paper on "Vertebrate and Plant Life on Ben Nevis," by Col. Feilden (read by Mr. H. G. Geldart), described an ascent of that mountain on August 27th last. The remains of three male snow-buntings, lately killed, were found at sixty-six feet below the summit, their death probably due to a hawk, though no small hawk has been seen near the observatory. At least three if not four broods of these birds have been hatched out this season near the top of Ben Nevis, but their nests have not been found. On August 25th, the Observatory cat brought in a shrew mouse, *Sorex minutus*, which must have been caught very near the summit. Sixty-six feet below the Ordnance Cairn, and 4,340 feet above the sea, three flowering plants were found, *Saxifraga stellaris*, S., a *Carex* and a grass; this is probably the most elevated locality for flowering-plants in Great Britain.

# SAILING FLIGHT OF BIRDS.

By G. H. Bryan, Sc.D., F.R.S.

IT is not often that papers read before the Mathematical and Physical Section of the British Association possess a biological interest, but the flight of birds is a subject of importance alike to physicists, to biologists, and to engineers, who hope sooner or later to reproduce this form of locomotion by mechanical means, and accordingly we have invited Dr. Bryan to furnish us with an abstract of a paper read by him last September, which he has kindly sent us, with additional notes.—Ed.

## Sailing Flight of Birds.

That birds are, under certain circumstances, capable of supporting themselves indefinitely in the air without expending energy by flapping their wings is a matter of common observation. To account for this apparent realization of "perpetual motion," various theories have been proposed, among which the most important are the three which suppose the seat of available energy to lie in:

(1) Upward air-currents (Mr. Maxim).

(2) Variations of the wind-velocity at different heights above the ground (Lord Rayleigh).

(3) Variations of the wind-velocity from one instant to another, the wind habitually blowing in gusts separated by lulls (Professor Langley and others).

Before proceeding further, another source of energy may be mentioned, namely, the presence of *vortices*, *i.e.* miniature whirlwinds or cyclones in the atmosphere. Even on a perfectly calm day one of these little vortices may sometimes be seen travelling across a road, carrying up a funnel-shaped cloud of dust. According to mathematical theory, a vortex always consists of the same particles of fluid; and, even under the modified conditions which occur in nature, our experience of cyclones tells us that such vortices are remarkable for their persistency, and their motions are so regular that it would be easy for birds to take advantage of them. This would account for the fact that birds so often congregate in a certain spot when in sailing flight.

Against the third hypothesis has been objected:

(i.) That to take advantage of every puff of wind in such a way as to be lifted by it would be a difficult feat of aërial gymnastics, whereas birds appear to circle in the air without requiring to exercise any particular alertness or agility.

(ii.) That the variations in wind-velocity are not sufficient to sustain the weight of a bird in the air.

In answer to the first objection, it is to be observed that if the bird's centre of mass is slightly *below* the wing-surface—especially if the wings are slightly curved upwards, as described by Mr. S. E. Peel in a letter to *Nature* for August 6th, 1896—the action would be purely automatic. We may illustrate this point perhaps better by considering the parallel effect in the seeds of many composite plants (such as the common 'dandelion'), which are supported in the air by a parachute placed at some distance above them. If a sudden gust of wind blows upon such a seed, the parachute is set in motion more rapidly than the seed, causing the whole to heel over so as to receive the wind on the under surface of the parachute, and this lifts the seed. When the wind subsides, the greater inertia of the seed carries it on in front of the parachute, causing the latter to again present its under side to the air, which again lifts the seed. The more the seed is blown about, the more it rises in the air.

This action would take place automatically in the same way in any body whose supporting parachute, aëroplane, or wing-surface was slightly *above* its centre of mass. The height of the supporting surface should not be too great, otherwise the body would heel over too much, and would make so great an angle with the horizon that the lift would be considerably reduced. The effect evidently depends on the *inertia* of the body, and the lift could therefore be increased by increasing the body's *mass*. But this would also increase the *weight* of the body in the same proportion, so that no advantage would be gained. The difficulty is overcome in the case of the sailing bird by the increased buoyancy which it is able to obtain from the air in consequence of the horizontal speed at which it travels, and herein, to my mind, lies the answer to the second objection. Professor Langley(1) has found (1) that a horizontal plane under the action of gravity falls to the ground more slowly if it is travelling through the air with horizontal velocity than it would do if allowed to fall vertically, and (2) that the horse-power required to support a body in horizontal flight by means of an aëroplane is less for high than for low speeds. Hence it readily follows that the bird's forward motion causes it to fall through a smaller height between successive gusts of wind than it would do if it were at rest, and that when a *side* wind strikes the bird (*i.e.* a wind at right angles to the bird's course), the lift is considerably increased in consequence of the bird's forward velocity.

According to this theory, the sailing bird derives its energy from fluctuations in the wind-velocity, which causes it to strike the bird at *right angles* to

(1) "Experiments on Aërodynamics."

its course. Such side winds would, in particular, be brought into action first on one side and then on the other, whenever the bird passed through the centre of an atmospheric vortex. The exact part played by variations of wind-velocity *in the direction of the bird's course* is more difficult to understand, but it seems improbable that such variations alone could account for the phenomena. If the bird were moving slowly enough to receive the wind sometimes in front and sometimes from behind, it would at intermediate instants be at rest relative to the wind, and would then obtain the minimum degree of support. If it were moving rapidly through the air the latter would always strike the bird in front so that its horizontal motion would be constantly retarded.

Anyone watching a flock of birds will observe that they often actually *are* carried up by a sudden side-gust of wind in the manner here described, showing that if this is not the only cause of the phenomena presented by the sailing bird, it is at any rate *one* of the causes. So much has been written on the subject that it is impossible to say how far these remarks may have been anticipated by other writers, but I think they may help to clear up some of the difficulties which have been experienced in accounting for the sailing of birds.

The above paper was written at Cambridge, where very few birds are observed to "sail" for any considerable length of time. The explanations which were suggested purely by theoretical considerations obtained a striking confirmation in the course of the excursion of the British Association to the Atlantic steamer "Campania," when the author was enabled to watch the gulls sailing on the River Mersey. A strong wind was blowing at the time, so that when the gulls were at rest, the effect was precisely the same as it the birds were moving through still air with a velocity equal and opposite to that of the wind. It was observed that every now and then the wind would swerve round in direction so as to strike the gulls sideways. When this happened the birds would heel over on one side so as to catch the side-wind on the underside of their wings, and immediately rise in the air.

Some writers have suggested that the *actual velocity* of the wind and not the variations of this velocity constitutes the source from which the bird derives its energy. But a knowledge of the laws of mechanics shows that a *uniform* current of air does not possess any more energy available for a bird floating freely in it than does a mass of air at rest. In the discussion following the reading of the paper, Professor G. F. Fitzgerald, who has himself made some experiments with artificial wings, pointed out that such fallacious arguments were readily met by the consideration that the *whole* of the earth's atmosphere, in consequence of the earth's orbital motion round the sun, is moving at the enormous rate of eighteen miles a second. If we are not able to easily support ourselves in the air in a wind blowing with this enormous velocity, we thus surely have sufficient proof that a *uniform* wind is not capable in itself of supporting a bird.

It is different in the case of a kite fastened to the ground with a string. Here the *difference* of velocity of the wind and ground—in other words the *relative* motion of the wind as compared with the point of support—furnishes a source of *available* energy, and the effect is the same whether the air is in motion and the point of attachment is fixed, or the air is at rest and the kite is being drawn along by a string.

*Cambridge; October, 1896.*

## RHYNCHOLOPHUS PLUMIPES,

By C. F. George.

THIS beautiful and very wonderful looking mite has not (so far as I can ascertain) been recorded as found in the British Isles. When I first saw it I thought it was new to science, but my friend, Mr. Michael, informs me that it was originally found by Lucas, in Algeria (Annal Soc. Entom. France, 4 ser. t. iv., p. 206.), and has also been figured by Haller ("Zur Kentniss der Schweizerischen Milbenfauna," Zeitsch. Wiss., 1880); it has also been found in Switzerland, and abundantly in Corfu.

The specimen was found early in August, 1894, by Mr. W. A. Luff, of Guernsey, on the sand-hills in St. Owen's Bay, Jersey. When he found it, it was moving pretty quickly and carrying its posterior brush-like legs elevated in the air. It is, when alive, of a beautiful scarlet colour, and scattered over its body are a number of club-like hairs.

The Rhyncholophidæ form Koch's second family of earth-mites, and are mostly very handsome creatures when alive, rejoicing in various beautiful shades of crimson, yellow and black, well deserving their name of ornament-mites. They are somewhat difficult to mount in balsam, and, of course, fluid removes all their splendid colours; their legs, also, are difficult to arrange, they are very delicate, and have a tendency to curl up. The best way to kill them for mounting is, I think, to pour boiling water suddenly over them whilst they are moving. They resemble closely Koch's first family of earth-mites, the Trombididæ or velvet mites, so well known by the rather common but very beautiful *Trombidium holosericeum*, found often in our gardens. The position of the eyes, as well as their structure, easily distinguish the two families from each other. Koch figures and describes eighteen species, but *Rhyncholophus plumipes* is not one of them, as it was unknown to that author. It would be interesting to know of what use to the creature can be the curious brush-like tarsi.

*Kirton-in-Lindsey.*

# ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Continued from page* 128.)

## II. Plectopylis.

In the genus *Plectopylis*, now to be considered, we find the armature more complicated than in *Corilla*. In the latter, we have seen the parietal plates to be invariably more or less horizontal, and the palatal plates—normally four in number—to be either horizontal or oblique, and always simple. The species of *Plectopylis*, however, are characterized by the possession of vertical as well as horizontal barriers, which in some cases are double, frequently bifurcate or ramified, and the plates or folds are often very numerous. The genus contains a far greater number of species than *Corilla* (more than fifty being known), and it has a much wider range, being found over the whole of the Indian Peninsula, including the Himalayan Range, Burma, Cambodia, Tongkin, extending north to Central China, with three species in Ceylon, and a reputed single outlier in the Andaman Islands. The Philippine Islands are credited with four species, but the absence of a vertical barrier on the parietal wall renders their position in the genus somewhat doubtful; as the anatomy of the soft parts, however, has not, to my knowledge been studied, it may be advisable for the present to retain these four species in *Plectopylis*. Many of the species are sinistral; dextrorsity, however, is the rule.

*Plectopylis andersoni* (figs. 17*a-c*), which was described by Mr. W. T. Blanford, in the "Proceedings of the Zoological Society" for 1869, p. 448,


Fig. 17.—*Plectopylis andersoni.*

was found near Bhamo and Ava, in Upper Burma, and on the Yun-nan frontier. It is a solid, disc-shaped shell, measuring 24 to 26 millimetres in diameter, of a light brown colour, with alternating streaks of a lighter shade on the upper surface. It is composed of eight whorls, distinctly ribbed above and below, and very regularly decussated above by raised spiral lines reaching as far as the apex of the shell, the base is also spirally sculptured, but the sculpture is less distinct; the mouth of the shell is unarmed, but the parietal callus forms a raised curved ridge which is distinctly free at both ends from the peristome. The armature, which is comparatively simple, occurs a little beyond the middle of the last whorl, and consists of a simple strong vertical plate on the parietal wall (see fig. 17*a*), giving off at its upper extremity a very small horizontal tooth on the posterior side and a short horizontal lamella, 1, 5 millimetres long, on the anterior side, while at its lower extremity there is a slight callus on the posterior side. The vertical parietal plate is shown sideways in fig. 17*b*, where also the palatal teeth are seen as they appear from the posterior end. Fig. 17*c*, gives the inside view of the outer wall, exhibiting the palatal armature. The palatal armature consists of four principal horizontal lamellae terminating posteriorly in a triangular conical tooth; above these are: first a minute tooth, and secondly, higher up, a small fold near the suture, while at the base of the palatal wall are also: first a minute tooth, and secondly, nearer the suture, a small fold. The specimen figured is from Mr. Ponsonby's collection.

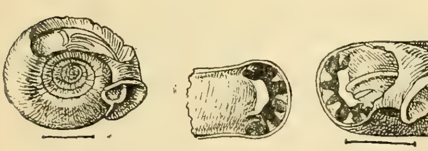
*Plectopylis brachydiscus* (figs. 18*a–c*) was described and figured by Lieut.-Colonel Godwin-Austen, in the "Journal of the Asiatic Society of Bengal," xlviii.


Fig. 18.—*Plectopylis brachydiscus.*

(1879), p. 2, t. 1, f. 1, from specimens found on the high range of Mulé-it, east of Moulmein, Tenasserim. As in that work, however, the palatal armature is not figured, I am glad to be able to supplement the figures there given. The specimen now figured, from Mr. Ponsonby's collection, is old and weatherworn, and it does not possess the marginal fringe of hairs shown in Lieut.-Colonel Godwin-Austen's figure. The shell is described as being of a dull umber brown; it is disk-shaped and regularly coiled, consisting of seven whorls, finely ribbed and spirally striated above; it measures 19 millimetres in diameter. The peristome is strongly reflected and the parietal callus has a strong, raised, flexuous ridge, separated from the peristome, and has, in addition, about the middle, a free lamella, 3 millimetres long (see fig. 18*a*). The parietal armature consists further of a broad, vertical

plate, angulated above, and giving off at its lower end towards the aperture, a horizontal plate, 4 millimetres long, which slopes abruptly towards the parietal wall and gradually loses itself, while on the posterior side there is a very short ridge abruptly sloping obliquely downwards (see figs. 18*a* and *b*); about the middle of the vertical plate a free horizontal plate occurs, about 7 millimetres long, separated from the vertical plate by a distance of 1 millimetre, decreasing in height as it approaches the aperture, and then suddenly terminating (see fig. 18*a*.) The palatal armature is very curious (see fig. 18*c*, which shows it *in situ*), and consists of six folds: the first straight and horizontal; the second also straight and horizontal, but with a small bifurcation at the posterior end; the third partly horizontal and deflecting posteriorly at an obtuse angle; the fourth very short horizontally, descending vertically for a short distance and then deflecting posteriorly; the fifth very short, flexuous, and nearly vertical; while, finally, the sixth is again almost horizontal. A little below, and to the left of the sixth fold, is a small tooth, while above, posteriorly to the first fold, and almost in a line with the bifurcation of the second fold, are three minute teeth.

*Plectopylis perarcta* (figs. 19*a-c*) was described by Mr. Blanford in the "Journal of the Asiatic Society of Bengal," xxxiv. (1865), part 2, p. 75, and first figured by Dr. L. Pfeiffer in "Novitates Conchologicae," iii. (1867-1869), t. 108, f. 13-15. The



*a* *b* *c*

Fig. 19.—*Plectopylis perarcta.*

armature was figured by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society" for 1874, t. 74, f. 4. The species was discovered at Mya Leit Doung, near Ava, Upper Burmah, but the specimen now figured is from Hlindet, and is in the collection of Mr. Ponsonby. The shell is sinistral, disk-shaped, somewhat thin and fragile, and composed of six closely-coiled whorls, ribbed regularly above, smoother below, widely and deeply umbilicated. It measures 10 millimetres in diameter. The parietal armature is composed of a broad vertical plate, angulated above, but gradually decreasing towards the base, where it is also slightly deflected posteriorly. A horizontal lamella rises anteriorly about its middle, very close to it, yet distinctly separate (see fig. 19*a*), proceeding parallel to the whorl, deflecting with it towards the aperture and joining the raised flexuous bilobed ridge of the parietal callus, which is separate from the peristome (see fig. 19*c*). Another horizontal but very short lamella, below the principal one, also rises close to the vertical plate; a short free horizontal lamella is seen below the vertical plate, but it does not pass beyond it posteriorly (see fig. 19*a*; this third horizontal lamella is also shown sideways in figs. 19*b* and *c*). Lieut.-Colonel Godwin-Austen, in comparing the present species with *Plectopylis pseudophis*, states that the horizontal lamella is not continuous, and it is shown to be interrupted in his figure (Proc. Zool. Soc., 1874, p. 609, t. 74, f. 4), and again, in describing *Plectopylis brachydiscus* (Journ. Asiat. Soc., Bengal, xlviii. (1879), p. 2), he informs us that that species resembles *P. perarcta* in this respect. The specimen here figured, however, has the principal horizontal lamella continuous, a fact which induced me at first to doubt the specific identity of the shell figured by me with *P. perarcta*, but as the second horizontal lamella is joined to the vertical plate in *P. pseudophis* and in my specimen this lamella is quite free, as stated to be the case in *P. perarcta*, it is evident that my shell is not *P. pseudophis*; moreover, Mr. Blanford, in describing the shell, states that from the centre of the curved ridge at the aperture, "a lamella runs up the whorl towards the parietal plication." It may, therefore, safely be assumed that in the type specimen the horizontal lamella is not interrupted, and the question arises whether the shell figured by Lieut.-Colonel Godwin-Austen was perfect in having the horizontal plate interrupted in the manner described. The palatal armature is simple, and consists of four short, somewhat strong horizontal folds, equidistant and parallel, with a smaller one above, close to the suture, and two small ones in a line with each other below, also near the suture (see figs. 19*b* and *c*, the former figure showing the posterior, and the latter the anterior ends of the folds; of the two bottom folds only one is visible in either figure).

*Plectopylis shiroiensis* (figs. 20*a-d*) is allied to the

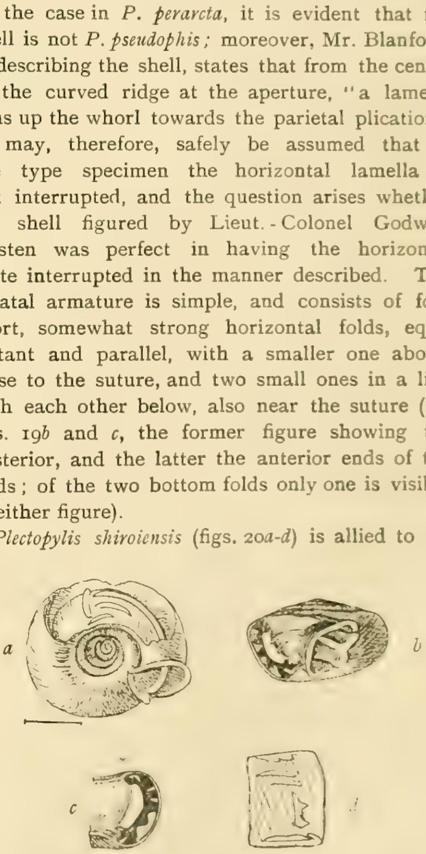



Fig. 20.—*Plectopylis shiroiensis.*

preceding species, and is likewise sinistral, but the shell is smaller, measuring 7·5 millimetres in

diameter, it is more raised in the spire and the last whorl is less deflected in front: there are also differences in the armature as indicated below. The species was described and figured by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society" for 1874, p. 609, t. 73, f. 3, where he states that it occurred in great abundance on the slopes of the peak of Shiroifurar, north-east of Munipur, at an altitude of 8,000 to 9,000 feet, and only in the short grass skirting the edge of the forest. The specimen figured is from the Daffla Hills, and is in the collection of Mr. Ponsonby. The parietal armature is similar in character to that of *P. perarcta*, but the principal horizontal plate is more flexuous, being somewhat raised towards the vertical plate and again towards the aperture before its final deflection at its junction with the parietal callus; it is also much broader. The second horizontal plate is also broader and flexuous, while both are a little more distant from the vertical plate (see fig. 20*a*). The vertical plate is smaller than in the species just mentioned, and rounded at the top, while it is not deflected posteriorly below as in that species. There are, besides, two small very short ridges given off from the extremities of the vertical plate on its posterior side; the third horizontal fold is also a little longer as well as more flexuous than in *P. perarcta*. The chief difference, however, is in the palatal plates, as may be seen on reference to figs. 20*b*–*d*. The first is horizontal, small and bilobed, close to the suture, then come two horizontal plates, small but comparatively broad, next a broad and strong vertical bilobed lamella, giving off on the posterior side two short ridges from the


Fig. 21.—*Plectopylis dextrorsa.*

base of the lobes (see fig. 20*d*), and below this a small but broad horizontal plate with a small tooth a little above and posterior to it. Fig. 20*b* shows the barriers from the side of the aperture, and fig. 20*c* from behind.

*Plectopylis dextrorsa* (figs. 21*a*–*c*) was originally described by Mr. Benson in "Annals and Magazine of Natural History" (3), v. (1860), p. 246, as a dextral form of *P. leiophis*, from Tenasserim, and it was figured in Hanley and Theobald's "Conchologia Indica," t. 13, f. 9, and in Tryon's "Manual of Conchology" (2), iii., t. 35, f. 2, as *P. refuga*, var. *dextrorsa*. Lieut.-Colonel Godwin-Austen was the first to point out its specific distinctness from *P. leiophis* (Proc. Zool. Soc., 1875. p. 44), and he raised it to specific rank under the name of *Plectopylis dextrorsa*. He further stated that it is very close to *P. pseudophis*, but his figure of that species (loc. cit., 1874, t. 74, f. 3) does not bear out this view, and, after a careful comparison, I am inclined to consider its nearest ally to be *P. brachydiscus*. The shell, however, is smaller than that of the last-named species, measuring 16 millimetres in diameter, and there are differences of importance in the armature. The parietal vertical plate is rounded at the top, and forms a short ridge posteriorly, while another but much smaller ridge is formed at the base, first proceeding a little horizontally and then deflecting a little towards the suture (see fig. 21*a*); the principal horizontal plate begins at a little distance from the vertical plate as in *P. brachydiscus*, but it is placed above the middle and therefore nearer the suture than in that species, and instead of revolving parallel with the suture it bends upwards a little and proceeds without interruption as far as its junction with the raised ridge of the parietal callus (see fig. 21*a*) at the aperture, while in *P. brachydiscus* it is interrupted. Other differences in the palatal armature will be observed on reference to fig. 21*b*, where the inner side of the shell wall bearing the folds and teeth is shown. The first plate is long and horizontal; the second is also horizontal, and bifurcates as in the other species; next come two series of three folds each, the anterior ones horizontal, the posterior ones smaller and obliquely descending; and lastly we have a strong broad tooth parallel with and near to the suture, with a smaller one posteriorly in a line with it. Fig. 21*c* shows the barriers of this species—parietal and palatal—from the posterior side.

P.S.—With the Editor's permission I take this opportunity of mentioning that as yet I have been unable to obtain specimens of the following species of the genus under consideration: *Plectopylis diptychia*, *P. muraia*, *P. oglei*, *P. munipurensis*, *P. feddeni*, *P. biforis*, *P. jugatoria*, *P. revoluta*, *P. phlyaria*, *P. vallata*, *P. eugeni*, *P. lambacensis*; and that I should much like to be favoured with them, either on loan or otherwise. In the case of malacologists having duplicate specimens, I should hope to be able to make a suitable exchange, as for instance, *Corilla fryae*, the new species described in the September number of this magazine.—Address: 5, Giesbach Road, Upper Holloway, London, N.

(*To be continued.*)

# THE CLIMACTERIC IN EVOLUTION.

By F. T. Mott, F.R.G.S.

IN the September number of Science-Gossip, the Rev. Hilderic Friend, in his "Botanical Jottings," starts a question regarding the flowers of the guelder-rose, which leads direct to one of the most fundamental controversies of modern science: Do individual organisms exist *for the sake* of continuing the species?

Is reproduction the aim and end of individual life? Is it true that Nature is careless of the individual, and careful only of the species? Or, is the individual the real and important unit, and the species a mere group of units? The individual the thing which develops and evolves, while the species is no more than the aspect of the changing group at a given moment? Or, is there not a theory more probable than either of these—*viz.*, that the individual, the species, the genus, the order, etc., are all phenomena of similar and equal value; all waves of cosmic activity of which the smaller are constituents of the larger, while the larger are constituents of the still larger, and so on *ad infinitum;* the species being an evolving wave of which the constituent elements are the evolving individuals, while the genus is also an evolving wave of still greater complexity, made up of the evolving species?

If we conceive of these waves of cosmic activity not as simple oscillations or undulations, but in the more complex form of *concentrating* waves, that is, as exhibiting in their first phase a concentration of energy towards a central climacteric, and in their second phase a dispersion of energy towards the circumference, we shall recognize that every such wave has a definite limit and must finally become extinct. In this necessity the theory corresponds with and explains the primary condition of all organic life. It explains much more than this. It makes the wonders of evolution comprehensible, and throws much light both upon the past and the future; upon the geological record, and the inevitable development of beauty. Evolution is the progress of a wave towards its climacteric; when this is reached there comes retrogression and extinction. If we find ourselves in an evolving universe, it means that the end is not yet; that the great inclusive infinitely complex wave, of whose limits we can know nothing, is still rolling upwards towards a climacteric of inconceivable beauty. Many of its constituent waves reach *their* climacterics and are dispersed; but their places are filled by other concentrations of still higher possibilities, and always it can be shown that visible beauty is the sure signature of an approaching climacteric. What is beauty? It is primarily a mental idea due to the perception of *relationship* among a group of sensations. For the perception of such relationship by human minds, it is necessary that the group of sensations should be actually related in close and simple proportions, and it is one of the necessary results of the concentrating wave that its constituents should be brought into closer relations to each other as the climacteric is approached. Thus the human mind recognizes that relationship only when the wave is near maturity, and beauty becomes the mark of such maturity.

Let us return to our guelder-rose. In the highest vegetable structure there are four distinct systems of tissue, *viz.*, the fundamental cellular tissue, the woody stem and branch system, the fibrous leaf system and the sensitive blossom. These are consecutively developed in this order. The blossom is the final climacteric of the individual. In most perennial plants there are subordinate annual climacterics of blossom, but in each individual there comes some one year when its blooming-power is at its maximum. Sexual reproduction is associated in plants with this latest phenomenon of their development, the blossom; but other methods of reproduction, by buds, by gemmæ, by stolons, etc., have no connection with the blossom. The progressive development of blossom, from the ferns, through the cycads and palms, to the present lilies and orchids, and from the lycopods, through thec oniferæ and the amentiferæ, to the roses, the leguminosæ and the labiates, is very striking. The progress is in size, in form and in colour, and always in the direction of greater beauty.

In the light of this reasoning I should reply to Mr. Friend's question, "Which is the typical form of the guelder-rose?" that the only one which can be properly called typical is the garden form. The others are successive steps towards the attainment of that climacteric in which the corolla, which is the essential part of the *flower*, is developed in its utmost beauty.

I am quite aware that all this is botanical heresy. Every useful thought has been heresy in its day. Fifty years hence it may be sound orthodoxy. Any way, this is one possible view of the system of nature, and it seems to me a much more satisfactory theory than what is held to be orthodox at the close of this nineteenth century. I have only sketched it in the barest outline to indicate my ground for calling the beautiful "snowball-tree" the most typical form of the guelder-rose.

*Crescent House, Leicester; September, 1896.*

# GREEN SCUM ON WATER.

By James Burton.

In July, the surface of the water of the Military Canal at Hythe, was covered with numerous patches, of varying size, of a pale yellowish green slime. I expected they would prove to be composed of one of the many different forms of *Euglena* which are so common, often giving a green colour to water and collecting on the surface. On bringing some home for examination, the patches were found to consist almost entirely of one of the Nostochaceæ. The nomenclature of this order is uncertain, and the determination of the genera by no means easy, partly owing to the number of naturalists who have attempted its arrangement. My specimens consisted of short, nearly straight filaments of minute globular cells, somewhat flattened where joined to their neighbours, of a pale yellowish green, filled with granular protoplasm, many of them more or less constricted in the middle, showing they were undergoing division. At intervals, a cell with clear contents and decided spherical form occurs, these are called heterocysts, but their function does not appear to be known. Occasionally also a much larger cell is found, ovate in shape, and filled with densely granular protoplasm, these are sporangia and contain each one spore at maturity, enclosed in a second wall. The whole resembled very closely the common nostoc, the chief differences being that in nostoc the sporangia, so far as I am aware, are absent, and the filaments are enclosed in a mass of jelly-like substance, which here was almost if not entirely wanting. The fact that the heterocysts and sporangia occurred at intervals, separated by ordinary cells, while the sporangia were not greatly elongated, would indicate that the specimens belonged to the genus *Anabæna* (see under heading "Trichormus" in third edition "Micrographic Dictionary"). The plants lived very well for several days in a collecting-bottle, apparently without any change taking place, but when transferred to a small aquarium, in which it was hoped they would flourish, the mass at once broke up and the organisms were diffused through the water and perished. This was the more regrettable as a careful examination had not been made, and it was necessary to fall back on a mounted specimen for identification and description. This has consequently been rather doubtful, as a certain amount of alteration may have taken place in the process. Very likely the water of the canal is brackish or even salt, and the fresh water proved fatal to the plants. Among the *Anabæna* there were also numbers of small-lobed masses of jelly with minute green *separate* cells embedded in them, closely resembling the figure of *Chloroccum frustulosum* in Dr. Cook's "British Freshwater Algæ," but I have not the text of the book at hand for reference as to habitat, etc. There were present a few of the ubiquitous spindle-shaped *Euglena* with red "eye-spot" at one end and clear pointed tail at the other.

Since writing the above I have come across another example of the order. This was on the surface of the earth, in a large flower-pot under a bell-glass, and the characters being more definite than in the other case, identification as *Cylindrospermum* was easy and certain. The gelatinous matrix, instead of being in lumps, or more or less globular masses, as is the case with *Nostoc commune*, is spread in a thickish layer on the substratum, so that the whole is much less noticeable. The general colour is dark green, but brighter than in *N. commune*. The plant consists of somewhat short beaded strings. The ordinary cells are globular, slightly flattened where joined to their neighbours, and filled with granular protoplasm. The heterocysts and sporangia are very characteristic; the former are terminal, globular, protoplasm clear pale green and fringed with hairs, sometimes longer than the breadth of the cell; the sporangia are cylindrical with rounded ends and densely granular contents, and occur next the heterocysts, *i.e.* they are penultimate. The position and form of these cells indicate *Cylindrospermum*. According to the "Micrographic Dictionary," the plant is "distinguished under the microscope by the resemblance of the filaments to an annulose animal, the ordinary cells looking like a jointed body, the large elliptic sporangial cell like a thorax, and the terminal vesicular cell often bearing fine hairs, like a head." At any rate it is an interesting and distinct form.

Owing to the wet autumn, lower algæ of many species are extremely common now, every footpath, the bases of walls and trees swarm with them; all are well worth and easy of examination, but identification is often difficult. Dark blue-green *Oscillatorieæ* show like a black stain, and various *Palmellaceæ* almost like a patch of blood. A common form is very similar to, if not identical with, that causing "red snow" so often invested with a gleam of sentiment in accounts of Alpine travel. I shall be pleased to forward a small specimen of *Cylindrospermum* to anyone caring to enclose address and stamp for postage.

9, *Agamemnon Road, West Hampstead, London.*

# NOTES OF A HOME NATURALIST

By Mrs. Emily J. Climenson.

THE writer of "Notes of a Home Naturalist" took her summer flight to Bournemouth on July 23rd. Two precious water-beetles were entrusted to a kind friend, the best fish pensioned out, and all the rest of the contents of the aquaria, great and small, consigned to their native habitats. The weather was so hot that for weeks the slightest exertion was terrible, hence an enforced absence of much energy in natural history pursuits. Since the break up of the extreme heat, the constant rain, alternating with high wind, has made rock-searching (for which one has to go to Swanage) and butterfly catching almost impossible. In a little pond on the West Common here, the product of heath drainage, are an enormous amount of *Dytiscus* and *Acilius sulcatus* beetles, some large and savage "boatmen" or *Notonecta glauca*, and some of the largest *Corixa* I have ever seen, as big as an ordinary Thames *Notonecta*, the scutelum marked with a strongly-defined diagonal cross. Being tired of keeping *Dytiscus* beetles, I have devoted myself to the *Acilius sulcatus*, and have four alive and merry, living in a glass jam-jar, fed upon little pieces of raw meat.

At Swanage, on August 15th, I found some nice specimens of anemones, viz., brown, red and spotted *Actinia mesambryanthemum* or "beadlets," and *Anthea cereus* or "opelet," also one bright green anemone with an exquisite blue rim at the base. On August 19th, when brushing off the skin-like exudation that anemones exude, with a camel's-hair brush (which they like as any fine lady may the manipulation of her abigail), I found four baby anemones, each the size of a pin's head, who had taken to an empty limpet shell as a cradle. A few days after, in changing the water in another finger-glass with anemones therein contained, one of them emitted three baby anemones. The shore being some little way off, I fetched the sea-water in a tin narrow-mouthed jug, which does not slop as a can would. The stored water turned very rusty, and on pouring the water incautiously into the glasses, a quantity of rust fell in. The anemones have lived through it, but diminished to a quarter their size, I suppose in consequence of the rust. The water being renewed after a few days, they are now rapidly recovering size and beauty.

On August 24th, in Little Durley Chine, I found some magnificent specimens of *Carduus marianus*, their lovely glaucous leaves, some over a foot long, veined and splotched with white. This thistle is a rare one, and the legend runs that the Virgin Mary, in nursing the infant Saviour, dropped some of her milk on this plant, which has for ever retained the mark. Even when dried and pressed, though turned brown, the leaf has the white splotches and veins distinctly showing.

The same day some blue gentians were found near the same place. They used to be fairly common here, but like their neighbours, the "cotton grass" (*Eriophorum*) and "bog asphodel" (*Narthecium ossifragum*), they seem to perish as the breath of mankind increases in their native habitat. Advanced population is synonymous with depreciation of flora, alas, when it approaches the haunts of what may be termed Flora's timid votaries. Never have berries been more abundant in this neighbourhood than this year, or earlier, blackberries being ripe and exposed for sale quite a month ago. In paying a visit to General Pitt River's most interesting place, Rushmore, the other day, we found plants of hoary mullein (*Verbascum pulverulentum*). This was in Wiltshire. I see in Bentham's "British Flora" it is only considered to grow in Norfolk, Suffolk, Surrey and Hants, though certainly Rushmore is not far from the Hants border. To all who love the acclimitization of beasts and birds in this country, a visit should be made to Rushmore. The list of animals and birds there to be seen would take too much room here. On the other hand, those who love studying birds should on no account be near Christchurch, Hants, without visiting Mr. Hart's museum of stuffed birds. Not only is he an enthusiastic naturalist, but he is a perfect artist in setting up those birds he obtains, generally in the most natural postures, and he groups them and surrounds them with the objects or plants they affect in a way that is most remarkable. With each bird (and many rare examples are to be seen there) is a little life-history he can tell that entrances any bird lover. Having known his collection before he made a museum for them, some twenty years or more, I can well vouch for its interest and its increasing development.

In the latter part of August, several men and boys appeared in Bournemouth with trollies covered with land tortoises. One man, who I remembered some years ago at Bournemouth, showed me an egg of the size of a blackbird's, very round, covered with white skin, which he affirmed to have been laid by a tortoise fished by him out of a pond which I remembered, now filled in, and declared it had been laid by the tortoise a few days after catching it. Is there any truth in the notion that these reptiles destroy black-beetles?

*"Glengoil," Bournemouth. September 17th, 1896.*

# BIRD LIFE ON A LOWLAND LOCH.

By Robert Godfrey.

On May 8th last, I set out to examine a few lochs in the Forth area, with a view to taking a census of the wildfowl at that date upon them, and thus gaining a clue to the number of birds about to nest or already nesting on each for the season. The first loch visited proved to be but meagrely tenanted, containing only two pairs and an odd female of the tufted duck, with the less significant waterhens, little grebes and coots; but the second was tenanted by some species of interest, and consequently detained me by its side during the remainder of my available time. The object of this paper is to describe briefly the life on this latter loch.

Crossing a ploughed field and passing through the low thick fox cover that borders the loch, I emerged on one of these spots, where, could the fear of intrusion be wholly dispelled, I could linger as part of the scene for many hours. A mist was rising from the water, but the sun was coming out behind me in his mid-day strength, and a strange peaceful silence brooded over the loch surface. A finely-varied herbage covered the area between the plantation and the water, and a line of iris flags grew on the verge. The willow-wren, the lark, and the reed-bunting were all in song beside me, each strain forgotten in the whole; the coots, disturbed by the unwonted appearance of an intruder, swam from the edge, and a pair of tufted ducks, so tame normally, rose and flew to another point, whilst a shoveller-drake crossed overhead to a patch of sheltering waterplants nearer the road, and, alighting there beyond my range, remained undiscovered when I went in pursuit. Coots were abundant, and a single waterhen rose, and peeweeps, redshanks and curlew were occasionally heard. I zigzaged across the damp long herbage that forms a splendid foreshore, in hope of rousing some sitting duck, but I found nothing save sucked eggs of coot and waterhen. Towards the middle and upper end of the loch numbers of ducks thickly dotted the surface, and a motley crew were forming a line upon the water when they were disturbed by the sudden report of a gun, and meanwhile dispersed. I walked slowly along the sheltered bank between the plantation and the loch, and, in my want of success at finding nests, I looked for a suitable resting-place from which to note the loch's inhabitants. The mist had meanwhile been dispelled by the strong sun, and the loch and its surroundings afforded a fine display beneath his genial rays. Far along the loch-side a second fir plantation grew nearer the water, and afforded, in the thickness of its growth, a temporary ambush, from which I might determine the number of birds present. Thither I accordingly repaired, and creeping under the dense firs till near the outlook on the loch, I settled in concealment amongst them. Opposite me, at a short distance from shore, was a small island covered with grass and shrubs, and proving a very attractive haunt for the birds of the loch, from the swan downwards; whilst just beyond me a small bay, lying in the lee of the island, acted as a further inducement to the ducks. Here the mallards were resting in the shallows, and by their fearlessness encouraging other birds to approach. I carefully surveyed the loch, and counted twenty-four pairs of tufted ducks on the surface, but failing to discern any shovellers, I saw the necessity of moving nearer the loch-head, and examining more critically the species on the edge of the enormous reed bed there.

My appearance was the signal for the swans showing their resentment by coming forward to drive me from their quarters. I considered myself safe from their molestation after I had passed round the bay, but before long, whilst paying heed to a robin near my side, I was startled by the swishing of the male swan as he flew along the surface in my direction. I was ready to slip into the wood if he approached too closely, but I did not require to yield to such an unceremonious retreat, and, moving on a little further, I sat down on a tree stump and rested quietly to allow of the loch's inhabitants assuming their normal conditions, and acting without fear before me. I intermittently scoured the surface with my glass, and succeeded in picking up another shoveller, at a great distance, however, from me. After a lengthened wait, I was at length gratified by seeing a shoveller-drake close to the island, swimming at his ease, and groping in the water for food, and finally resting on the verge of the isle. His fine display of colour, dark-blue head, white breast, and chestnut belly, all shown off to their fullest advantage by the mid-day sun, rendered him a match for the shell-duck in beauty.

Often in the fields it happens that when one's whole attention is required on an object, other objects seem just then to come before him and urge their own claims; and so it happened here. A carrion-crow had driven another bird to shelter in the wood behind me, and was now wildly clamouring to and fro above the plantation, making me anxious to know the object of his concern, but

he did not succeed in withdrawing my attention from the loch. There, however, my glass rested on the white neck of a large bird, and, as I still gazed upon it, the gorgeous red head flared out full in the sunshine and revealed a bird of equal importance with the shoveller, the great crested grebe. Beside it swam its mate, but both birds were still far out in the middle of the loch. A second shoveller-drake settled on another part of the same island, and a long period of inactivity amongst the wildfowl followed. The picture of peace thereafter displayed implied seldom disturbance of the area more immediately under my gaze, and the importance of the island to the birds was more and more impressed upon me during my stay. The suspicious mallards had forgotten their wildness in their supposed privacy, and were resting on the land; beside them reclined the tufted duck, a far less wary species, and the ever-watchful peeweep bathed and cleaned himself in silence, giving only a slight cry when he rose from the completion of his toilet. The skulking water-hen would call, but did not come forth to view, and the curlew would warn me as he passed by. On the island edge were the dainty teal, and in the shallows rested the shoveller, whilst coots in numbers swam idly by the shore. As king and queen over the diverse flock the pair of great crested grebes were now swimming fearlessly before me.

From its elongated body the great crested grebe resembles a diver on the water, the long, narrow bill and pure white neck are conspicuous, and the occipital tufts give the appearance of ears; occasionally the white secondaries would be revealed when one of the birds beat its wings. The bird carries its neck erect and bill horizontal; when swimming quickly it keeps its neck inclined forward, but when proceeding slowly it maintains a slight back and forward movement. The bird seems to have the power of altering its depth in the water, and, when diving, merely inserts its head and disappears, with hardly a motion on the surface. Both birds swam off again towards the middle of the loch and settled there, whilst the shovellers, with rapid sustained flight, made for another part of the loch.

My uprising did not create such a commotion as I had feared; the tufted ducks called as they swam off from land, and the main body of birds departed for awhile. The upper sources of the loch enclose a large extent of land within their bounds and are highly attractive for water-birds, whilst the enormous reed-beds afford secure nesting-grounds. I renewed my search for a shoveller's nest, which proved unavailing, and after a further rest in the meadows adjoining the loch, I left the companions of my ramble to settle again in their normal conditions of peace and solitude.

46, *Cumberland Street, Edinburgh; October*, 1896.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Handbook of Physiology*. By W. D. HALLIBURTON, M.D., F.R.S. 866 pp. 8vo, illustrated by 661 figures and coloured plate. (London: John Murray, 1896.) Price 14s.

This carefully-produced work is the fourteenth edition of Kirke's "Handbook of Physiology," which has been rearranged and to a great extent re-written, so much so that the book is practically a new one. There are also numerous additional illustrations which, with the letterpress, will be found to bring up the subjects treated to the most modern state of knowledge. A feature of these illustrations is the insertion of coloured figures on the pages among the letterpress. These are in most instances beautifully executed and add greatly to the interest of the book. The chapter on "Development," from an embryological point of view, contains the most recent results of investigation. We can highly recommend this work, not only to medical students, but also to many of our more thoughtful readers who will learn much from the lucid explanations which are so plainly set forth in its pages.

*Stenopaic, or Pin-Hole Photography*. By FREDERICK WILLIAM MILLS, F.R.M.S., and ARCHIBALD C. PONTON. Second and revised edition. 28 pp. royal 8vo, illustrated by a frontispiece and diagrams in text. (London, Dawbarn and Ward, Limited.) Price 1s. 6d.

We have already noticed the first edition of this work, which has evidently interested the public, as within four months there have been issued the first edition and a reprint thereof, also this second edition. The subject of pin-hole photography is within the reach of most amateurs, and this little work will give them sufficient instruction to proceed with ease. It can hardly be said to be new, as the pin-hole camera was designed about the year 1500, the idea being obtained through the camera-obscura, which was invented by Roger Bacon as far back as 1297. The frontispiece shows an excellent piece of photography taken by this type of camera.

*The Bichromate Salts in Photography*, by various authors. 28 pp. large 8vo. (London: Dawbarn and Ward, Limited, 1896.) Price 1s. net.

This pamphlet consists of six lectures delivered before the Affiliation of Photographic Societies, and are reprinted from *The Photographic Journal*, They are—(1) "Scientific and Historical Preliminary," by Captain W. de W. Abney, C.B., R.E., D.C.L.; (2) "Carbon Printing," by Mr. J. A. Sinclair, F.R.P.S.; (3) "Collotype," by Mr. W. E. Debenham; (4) "Woodbury Printing," by Mr. J. D. Geddes; (5) "Photo-Lithography and Photo-Zincography," by Mr. W. T. Wilkinson; (6) "Process Applications of the Bichromate Salts," by Mr. W. T. Wilkinson. Some of our readers may already have heard these lectures, but others who have not, will find them very useful, for no matter how practical may be their work, a little knowledge of theory, with familiarity with the work already done, will greatly help them.

## SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

Bulletin de la Société Zoologique de France (Paris: July, 1896). The question of the domestication of the African Elephant is considered by M. Edouard Blanc. In view of the probable extinction, in the near future, of this much-persecuted animal, this subject has come prominently before the public, since the European nations have divided the tropical zone of the Black Continent. In Germany the subject appears to have taken a practical turn, inasmuch that a committee for the domestication of the African Elephant has been formed in Berlin. The Government of the Belgian Congo has likewise made some efforts in the same direction. In France, M. Bourdarie has taken up the question, particularly with regard to the French Congo, and he has made some important communications on the subject to several learned societies, before leaving for West Africa, where he proposes to make direct attempts in this direction. That the African elephant has been domesticated in the past is affirmed by some, but denied by others. The undisputed fact of the use made by the Carthaginians, in their wars, of elephants, is, however, no proof in support of the theory, as these animals were, in all probability, obtained from Syria, where, at that period, they were used in combat. To attribute an African origin to the elephants of Carthage, it becomes necessary to suppose that a now extinct species existed at that time. In support of this view, the famous inscription of Adulis, now destroyed, but the text of which has been preserved, is cited. In it Ptolemy Evergetus relates the capture in this region of Ethiopian elephants to be drilled for war, and that with their aid he has overcome the Indian elephants sent against him in Syria and Asia Minor. In this inscription mention is also made of Troglodyte elephants, and it is supposed that this represents the native animal, which must have differed in its habits from its surviving relatives, as the dry, rocky, mountainous region of the Atlas and Abyssinia could never have presented the same physical conditions of the fertile and humid plains in which the two now-living species exist. It has, therefore, been supposed that *Elephas troglodytes* must have approximated in habit to the other extinct species, such as *E. priscus*, *E. antiquus*, and *E. melitensis*, and that it lived, if not actually in caves, at least in rocky, mountainous and comparatively dry regions. The specific character of this hypothetic species can only be guessed at, as hitherto not a vestige of bones has been found in Algeria. The author, however, thinks that the inscription of Adulis authorizes the assumption that the animal extended to Abyssinia, and he hopes that researches in that region will lead to better results in the future.

Proceedings of the Academy of Natural Sciences (Philadelphia, 1896).—Mr. H. A. Pilsbry, in conjunction with Mr. E. G. Vanatta, contributes a catalogue of the species of *Cerion*, with description of new forms. The genus *Cerion*, or, as it is commonly known, Strophia, as the authors inform us, is one of the most characteristic forms of West Indian molluscan life. With two exceptions the species are all insular; the two exceptions referred to are *C. incanum*, from South Florida Keys, and *C. antonii*, from Guiana. The Greater Antilles, Cuba, Hayti and Porto Rico, with the Virgin Islands and the entire group of the Bahamas, are inhabited by numerous species, with a multitude of local races. South of the larger islands named, if the faunally dependent Cayman Group and the Isle of Pines are included with Cuba, but one single species is found, *C. uva* of Curaçoa, singularly isolated in characters as well as geographically. Jamaica is without a species, and the genus fails also in the Caribbean chain. Generally speaking, each species is confined to some single island, or to a series of adjacent keys or islets; there are, however, numerous exceptions, and some forms, undoubtedly conspecific, are found on several islands separated by considerable distances. The species are stated to be subject to a remarkable range of individual and local variation, many varying from strongly and conspicuously ribbed to entirely ribless and smooth, while colour is equally variable, pure white forms varying to heavily brown-mottled in many cases. Absolute size of adults is stated to be almost as mutable as in Cypraea, and occasionally individuals are abnormally shortened by the premature assumption of the features of maturity, giving them a stunted appearance. All these considerations render the study of the species one of unusual difficulty, especially as the older authors, being unacquainted with the protean nature of the species, as well as with the usually restricted range of each, often failed to properly discriminate them. Mr. C. J. Maynard, an American writer on natural history, was the first to draw attention to these facts, and he found that the aperture-armature or teeth of the Cerions are variously arranged, and furnished a basis for dividing the genus into sub-genera. He further discovered and described a large number of most interesting species and varieties, especially in the Cayman Island group. The present authors, however, consider that he has unduly multiplied species and sub-species, basing them on characters which they hold to be slight and inconstant. The catalogue presented by the authors is the result of the careful examination and study of a very large collection of shells, and their object has been primarily to place before students a moderate estimate of the species of the group, specific values being held neither in extremely narrow nor very wide limits, but practically in conformity with the views represented by the leading English and American conchological authors of to-day. Of the anatomy of the soft parts little is known as yet; our authors add, however, to this subject by an illustration of the anatomy of a new species. They then divide the genus into four groups of sub-generic value, *i.e. Eostrophia*, *Cerion*, s.s., *Strophiops* and *Diacerion*. After enumerating the known species with the synonymy and some references to bibliography, they describe a number of new forms which are illustrated by a plate of thirty-one figures. The same authors also contribute a "Revision of the North American Slugs, *Ariolimax* and *Aphallarion*." The latter is a new genus proposed for a new species, perhaps the largest American slug. The anatomy of these two genera is investigated and compared with that of *Arion*. A key is given to the species of *Ariolimax*, and all the species dealt with in the paper are illustrated by a plate of sixteen figures.


CONDUCTED BY FRANK C. DENNETT.

| | Nov. | Rises. h.m. | Sets. h.m. | Position at Noon R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 8 | 7.9 a.m. | 4.19 p.m. | 14.57 | 16° 49′ S. |
| | 18 | 7.26 | 4.4 | 15.38 | 19° 26′ |
| | 28 | 7.42 | 3.54 | 16.20 | 21° 28′ |

| | Nov. | Rises. | Souths. | Sets. |
|---|---|---|---|---|
| *Moon* | 8 | 11.34 a.m. | 2.58 p.m. | 6.24 p.m. |
| | 18 | 2.43 p.m. | 10.33 | 5.29 a.m. |
| | 28 | — | 6.7 a.m. | 0.43 p.m. |

| | Nov. | Souths. h. m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 8 | 10.59 a.m. | 2″ 6 | 14.12 | 11° 45′ S. |
| | 18 | 11.22 | 2″ 4 | 15.14 | 17° 37′ |
| | 28 | 11.47 | 2″ 3 | 16.19 | 22° 10′ |
| *Venus* | 8 | 1.55 p.m. | 6″ 2 | 17.8 | 24° 16′ S. |
| | 18 | 2.10 | 6″ 5 | 18.2 | 25° 9′ |
| | 28 | 2.24 | 6″ 8 | 18.56 | 24° 48′ |
| *Mars* | 8 | 2.41 a.m. | 7″ 5 | 5.56 | 24° 32′ N. |
| | 18 | 1.59 | 8″ 0 | 5.49 | 25° 1′ |
| | 28 | 1.7 | 8″ 3 | 5.36 | 25° 26′ |
| *Jupiter* | 18 | 6.49 a.m. | 16″ 6 | 10.41 | 9° 25′ N. |
| *Saturn* | 18 | 11.30 a.m. | 7″ 0 | 15.22 | 16° 27′ S. |
| *Uranus* | 8 | 0.15 p.m. | 1″ 8 | 15.28 | 18° 38′ S. |
| *Neptune* | 8 | 2.4 a.m. | 1″ 2 | 5.16 | 21° 37′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Nov. 5 | 7.27 a.m. | *1st Qr.* | Nov. 12 | 5.41 a.m. |
| *Full* | ,, 20 | 10.25 ,, | *3rd Qr.* | ,, 28 | 2.44 ,, |

SUN.—The spots may be expected to be few and small. During September there appeared a slight increase of activity, a group of small spots, having a length of about one-fifth of the sun's diameter, followed by other spots, making the disc interesting. But for some two or three days early in October no spots were visible, and then only one small one.

MERCURY is not well placed for observation this month, being in superior conjunction with the sun on November 28th.

VENUS is an evening star, somewhat poorly placed, but may be observed towards the end of the month, setting a little after six o'clock.

MARS, notwithstanding its small angular diameter, may be well observed this month. The principal markings, on a favourable night, may be seen with any good telescope having an object-glass more than three inches in diameter, with powers from 120 to 250.

JUPITER rises about midnight during the month, and may be observed for some hours before sunrise.

SATURN and URANUS are in conjunction with the sun on November 13th and 16th respectively, and so cannot be observed.

NEPTUNE is in good position for observation, about 5° *p.*, or westward, of ζ Tauri.

METEORS should be carefully watched for in November, especially about 1st, 2nd, 4th, 6th-9th, 11th-15th, 19th and 27th, notably on 13th and 14th.

VARIABLE STARS.—The following are in good position during November:

| | R.A. h.m. | N.Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| ρ Persei ... ... ... | 2.56 | 38° 20′ | 3·4 | 4 | |
| β Persei (Algol) ... | 2.57 | 40° 27′ | 2·3 | 4 | 2d. 20h. 48m. 50s.* |
| λ Tauri ... ... ... | 3.53 | 12° 7′ | 3·4 | 4·3 | 3d. 22h. 52m. |
| α Tauri (Aldebaran) | 4.29 | 16° 16′ | † | | |

The 3·5 magnitude quadruple star Persei, R.A. 3h. 46m., N. Dec. 31° 30′, is also marked as a variable by the late Richd. A. Proctor.

NEW COMETS.—On August 31st, at Randolph, Ohio, Mr. Sperra discovered Comet IV., 1896, which was on later dates observed by Prof. Brooks, of Geneva, New York, and also by the observers at the Lick Observatory. At its perihelion, on July 7th, its distance from the sun was 108,000,000 miles; when nearest the earth, on September 12th, its distance was no less than 163,000,000 miles. It is slowly diminishing in brightness. It was situated near the so-called tail of the Great Bear, and its orbit was greatly inclined to the plane of our own. On September 4th, a very faint comet, V. 1896, was discovered by Signor Giacobini, of the Nice Observatory, in the constellation Ophiuchus. It was calculated to pass its perihelion on October 8·003d, Berlin mean time. It appears to be travelling in an elliptical orbit, whose plane is but little inclined to that of the earth. On September 20th, it is announced that Professor Lewis Swift, of the Lowe Observatory, California, discovered a bright comet not more than 1° to the east of the sun, and on the following evening found it somewhat fainter at a greater distance from the sun, and having a motion northwards. The observations, however, appear to have met with no confirmation.

SATURN'S RING SYSTEM.—M. E. Antoniadi writes: "With reference to the new 'divisions,' I must state that I do not consider them as being real separations, but rather rarefaction zones, more distinct at times than at others. The motion of the lines of absides of the orbits of the corpuscles composing the ring system and the variations of the major axes, both due to the influence of the satellites, must render the appearance of these lines variable. I do not think that these zones are quite free of matter."

A NEW DOUBLE STAR.—In the constellation Scorpio, about R.A. 16h. 41m., S. Dec., 38°, there are two stars of 3rd and 4th magnitudes marked respectively $\mu^1$ and $\mu^2$. The former has just been discovered to be a close binary by Mr. Bailey at the Observatory of Arequipa, Peru, a branch of the well-known Harvard College Observatory. The components are so close that it can never be hoped that optical means will be constructed to show them. This notwithstanding, the spectroscope reveals an alternate shifting of the dark lines in its spectrum, showing that it is sometimes advancing towards us, sometimes receding from us, thus indicating orbital motion, whilst its period is completed in thirty-five hours.

* Algol, being of considerable northern declination, may be observed during a great part of the year. It remains at its maximum for 2d. 13·5h., then for 3·5h. grows fainter, remains at its minimum 15m., and then during the next 3·5h. brightens to its maximum. Its period since 1782 is said to have decreased by 9s. The apparent explanation of the phenomenon is the revolution of a large dark planet round the bright star. The star will be at its minimum on the night of November 10th, at thirty-four minutes after midnight.

† The variation in this star is in colour from yellow-orange to yellow-red.

## SCIENCE GOSSIP

THE Toynbee Hall Educational Session was opened on October 4th, when a large proportion of the two thousand students attended the Annual Conversazione.

MR. JOHN E. PHILLIPS, of Woolhampton, Berks, has forwarded to us a specimen of his patent slate-cleaner. It is a most useful and ingeniously constructed article and we only wish they had been in existence in our own school days.

OUR correspondent, Mrs. Emily J. Climenson, the contributor of "Notes of a Home Naturalist," has lately issued an Illustrated Guide to Henley-on-Thames. Amongst much valuable information of a local character is a flora of the district, by Mr. G. Stanton, of Park Place Gardens, and notes on its geology. In the latter, the authoress has had the assistance of Mr. Llewellyn Treacher, of Twyford.

THE annual meeting of the Conchological Society of Great Britain and Ireland was held at the Manchester Museum, Owens College, when Professor Sydney J. Hickson, D.Sc., F.R.S., was elected President for the ensuing year, in place of Mr. J. Cosmo Melvill, F.L.S. The report was of a satisfactory character, and the financial statement of the Society's revenue and expenditure shows a substantial balance in hand.

Now that the Conchological Society has quite settled in its new home in the Manchester Museum, we hear that its members show increased activity in assisting, either by reading papers and exhibits, or, equally useful, in a passive manner by regular attendance. We often think that if members of scientific societies would attend more frequently at the meetings, they would do more than many of them imagine towards obtaining good papers and exhibits, which thin meetings so successfully discourage.

THE "Proceedings of the Bristol Naturalists Society" for 1895-96 are to hand, in the modest form of a seventy-two page pamphlet, illustrated by a portrait of Professor William Ramsay, F.R.S., who was associated with University College, Bristol, from 1880 to 1887.

WE fear that natural science does not offer many charms to the quarter-million inhabitants of the large city of Bristol, if judged by the report of the local Naturalists' Society. There is a general tone of "out-of-dateness" about it, which is lamentable. Even the presidency of the Biological Section is given as "vacant." Our copy of the "Proceedings" was forwarded to an address which has not for years past been that of SCIENCE-GOSSIP, nor is it even of the former publishers. That is only a small matter, for "London" is sufficient to reach us either editorially or to the publishers; but it shows, as the Americans would say, that Bristol biologists should "buck-up," or the loan of £28 11s. 8½d. from capital account will have to be increased if the society is to be kept going.

MR. EDWARD WILSON, F.G.S., the Curator of the British Museum, has issued the seventh edition, dated September last, of the official "Guide to the Museum." It contains several new features, and is sold for one penny.

THOSE of our readers who see the monthly journal, "The Ornithologist," may have noticed in last month's issue an article on "The Quest of the Erne," which was taken from SCIENCE-GOSSIP of the same month, without the permission of the Editor or knowledge of the author.

AMONG the latest Government Scientific publications of the United States of America is an important one on "Some Mexican and Japanese Injurious Insects, liable to be introduced into the United States." The work is issued by the Division of Entomology in the Department of Agriculture.

ON October 6th, about seventy courses of lectures and classes commenced at Toynbee Hall, in subjects varying from Cookery to the practice of Bach's Concertos and the study of Kant's Ethical Theory. Science includes "Missing Links," a course in Biology, by Mr. Chalmers Mitchell, and "Industrial Chemistry," by Mr. John Wade.

AMONG Messrs. Chapman and Hall's announcements of forthcoming works to be published by that firm is "The Naturalist in Australia," by Mr. W. Saville-Kent, F.Z.S., which will contain seven coloured plates and many other illustrations. There is to be only a limited edition of five hundred copies, at three guineas each.

A MOVEMENT is on foot for the protection of the African elephant, which in the face of the rapid development of civilization on that continent, seems likely to be exterminated. There ought not to be much difficulty at the present period for an international agreement to found some immense public reserves for the conservation of the elephants and other animals in a state of nature.

THE first parts of a new work on "British Birds with their Nests and Eggs" have been issued by Messrs. Horace Marshall and Son and Messrs. Brumby and Clarke, of London, in two-shilling monthly parts. The articles are by specialists in Ornithology, and the drawings are well executed by Mr. F. W. Frohawk. In size the plates and letterpress pages are $10 \times 12\frac{1}{2}$ inches, or royal quarto.

THE South London Entomological and Natural History Society will not hold one of its large exhibitions this autumn. There will, however, be a special evening on November 26th, at the Society's rooms, for the exhibition of varieties in any branch of natural science. This Variety Exhibition should be one of exceptional interest to naturalists generally, who are invited to attend and also to exhibit specimens.

THERE seems to have been a small flight this season of "Camberwell-beauty" butterflies (*Vanessa antiopa*) over Northern Scotland, where its occurrence is rare. Specimens have been recorded from several localities extending over a considerable range of country. We have not seen any of these examples, so cannot speculate whether they came from Scandinavia or North America, by way of the Faröe Islands. There is a distinct racial difference between the European and American forms of this handsome insect; the latter having the white borders more thickly dusted with small dark spots.

# Notes & Queries

Sirex juvencus in Surrey.—I found a fine female of this insect in a garden at Leatherhead on September 20th, this year. Can anyone tell me if the male of this handsome fly is ever seen, I know of no record of its capture?—*H. Mead Briggs, St. Mary's Road, Ealing.*

Vanessa antiopa in Skye.—A friend who has just returned from the Isle of Skye has given me a fine specimen of the Camberwell Beauty butterfly, which he took there on September 17th. Is not this unusually far north for it to occur?—*K. A. Deakin, Cofton Parsonage.*

Derivation of "Cleat."—I should be glad if some one of your readers would supply me with the etymology of the substantive, "cleat." I have not heard of the word in the Midlands, but in certain districts in Yorkshire it is in frequent use. It is there applied to the colt's-foot (*Tussilago farfara*). Near here (Bedford) is a hill which is known locally as Cleat Hill. Upon this rising ground is a thick deposit of clay, which renders the soil eminently suitable for the prolific growth of colt's-foot. Of that particular plant there is a sufficiently large quantity to make it noticeable. In the absence of any other reason for the hill to be so named, I have supposed that this distinctive presence of cleat is connected with the origin of the particular appellation.—*L. Amb. Roberts*, 19, *High Street, Bedford.*

Unio littoralis in Pleistocene Time.—The interesting article by Mr. A. S. Kennard in the last number of Science-Gossip is most valuable to all students of the Mollusca, giving, as it does, a reliable and up-to-date account of the distribution in England of *Unio littoralis*, Lam., during pleistocene time. Looking at the localities mentioned, it would appear that they were situated in the line of the ancient river system, and by this means this species with other freshwater forms were distributed. A study of its present distribution in France, Spain and other localities mentioned, with the conditions of existence, might afford some idea as to its manner of life in England. My object, however, in sending this note is to mention one other locality for the above species, not recorded by Mr. Kennard, viz., Orton Waterville, near Peterborough, where it was associated with the usual mammalian remains and the following mollusca: *Planorbis carinatus*, *Limnæa peregra*, *Bythinia tentaculata*, *Valvata piscinalis*, *Ancylus fluviatilis*, *Pisidium amnicum* and Helices.—*A. Loydell*, 19, *Chaucer Road, Acton, W.*

Leaf Variation.—In discussing the subject of leaf variation as determined by the influence of the environment, we must carefully distinguish between such as is caused by the plant "struggling" to avoid a too excessive transpiration, and such as is due to the struggle to adapt itself to more favourable conditions of assimilation. For instance, in the dandelion leaves figured at page 117 *ante*, No. 1 grows under conditions where there is no necessity for any special struggle of any kind, hence the leaf normally develops, but it is thin, and its palisade tissue is not well expanded. In figs. 2, 3 and 4, the external conditions are much more favourable both for transpiration and for assimilation, hence the total area of the leaf is contracted, while at the same time its thickness is increased, and its palisade tissue is much more developed. It is not exactly correct to say, therefore, as Mr. Wheldon does, that plants "occupying the driest situations exhibit the least development of parenchyma." The thickness of the lamina must be taken into account, and the ratio which the palisade bears to the lacunar tissue is exceedingly important. In the case of certain Ranunculi, *Potamogeton*, etc., which grow partially immersed in the water. The action of the aqueous medium by arresting the differentiation of the leaves in the bud, tends to produce an aphyllie more or less complete. Hence the process here is an arrest of development, rather than a special adaptation. As Mr. Wheldon puts it, "the capillary leaves almost totally disappear, and only leaves of the floating palmate or partite kind develop." That is, in this case, while the total area of the leaf is diminished, it at the same time gets attenuated, transparent, and sometimes the palisade tissue, etc., disappears altogether.—*(Dr.) P. Q. Keegan, Patterdale, Westmorland.*

Thecla pruni in Herefordshire.—In June of the present year, I was out for a long day's tramp with a friend in Herefordshire. Pond-hunting, for which we were provided with the necessary impedimenta, was to be a subsidiary object of the day's programme, and during our walk my friend pointed out some iris and other aquatic plants that indicated the presence of water. On reaching the spot we found that the plants were growing luxuriantly from the dried-up bed of a small pond. Although all water had disappeared, the bed of the pond was still sufficiently damp to easily take the impress of one's feet, and I noticed that the bases of the water-plants were thickly populated by the molluscous inhabitants of the pond who had migrated thither on the complete evaporation of the water. But what attracted my attention most was the profusion of a lepidopterous insect that from limited entomological knowledge I could only identify as one of the Hair-streaks. Having no means of collecting any, I took two in one of my pond-life bottles just for the purpose of identification, and on consulting a very old and imperfect entomological work some weeks afterwards I made out the insect to be the black Hair-streak butterfly (*Thecla pruni*) and found it described as very local, and giving about half-a-dozen English localities. On this I communicated with two friends who are capable entomologists, and their replies coincided in describing it as a very good find, neither of them possessing a specimen. The insect was in considerable profusion, quite a couple of dozen flitting about the area of the dried-up pond, and frequently resting on the aquatic plants, for the day was rather a boisterous one. They were in very fine condition. The particular neighbourhood of this small pond seemed especially attractive to many and varied kinds of life. Odonata were represented by one or two species, moths by several species, and dipterous insects in profusion; but beyond the presence of the wild mint, which certainly scented the surrounding air very strongly, I could discern nothing that seemed likely to offer special attractions to the insect tribe. I have purposely refrained from giving the precise locality of the insect, as it is not desirable for some collectors to know this.—*George T. Harris*, 33, *Lindore Road, New Wandsworth, S.W.*

# TRANSACTIONS

City of London Entomological and Natural History Society.—Tuesday, September 15th, 1896.—Exhibits: Mr. Tutt, eggs of *Pamphila comma*, which were hemispherical, inclining to conical, in shape, with a slight depression on the summit, and of a dingy grey colour. Also some *Aglais urticae*, exactly resembling typical English specimens (excepting, perhaps, a rather richer colouring on the underside), although they had been bred from a very dark Continental specimen. Mr. May, three *Epinephele janira*, showing various degrees of that failure in the development of the pigment commonly expressed by the misleading word "bleached"; also two specimens of *Triphæna orbona* (*subsequa*), and an example of *Limenitis sibylla*, showing very few traces of white on the wings, all from the New Forest. Rev. C. R. N. Burrows, a gynandrous *Gonopteryx libatrix*, a *Triphæna pronuba*, with longitudinal dark streaks on the fore-wings; a *Leucania pallens*, with asymmetrical neuration, and reddish suffused specimens of *Agrotis puta* and *Mamestra brassicae*, all taken on sugar at Rainham, Essex. Mr. Bloomfield, *Catocala sponsa* and *Dianthœcia cucubali*, among other insects, from Bures, Suffolk. Mr. J. H. S. Smart, a bred *Catocala nupta*, having both sides of the hind wings suffused entirely with purplish black, the usual black bars being quite distinct. Mr. May said he had seen a specimen of *Argynnis paphia* in the New Forest, with a strong tinge of the *valezina* colouration on the right hind wing. Mr. Heasler reported that he had heard on trustworthy authority that about a score of black *Limneitis sibylla* had been captured in the New Forest this year by various collectors.—*C. Nicholson and L. J. Tremayne, Hon. Secs.*

South London Entomological and Natural History Society, September 10th, 1896.—Mr. W. Mansbridge, F.E.S., in the chair. Mr. A. E. Hall exhibited a gravid female of *Germes bellicosus* from Cape Coast Castle, and a series of captured *Callimorpha hera* from Newton Abbot. Mr. Lucas, a female of *Platetrum depressum*, having the male blue colouration, a male *Calopteryx virgo*, having the right fore-wing without the dark pigment, and a pair of the rare grasshopper, *Thamnotrizon cinereum* from the New Forest. Mr. Montgomery, a bred series of *Dianthœcia capsincola* from Eastbourne, one specimen had a wide sub-marginal line and a marginal area without the wavy lines.—September 24th, Mr. C. G. Barrett, F.E.S., in the chair. Mr. R. Adkin, living larvæ of *Lycæna argiolus*, *in situ* on the buds of ivy-blossom, from Eastbourne, also full fed larvæ of *Aplecta occulta*. Mr. Filer, a fine variety of *Ernodia hyperanthes*, having the white spots surrounded by yellow rings only, the black rings being entirely obsolete. It was taken in Essex. Mr. Moore, specimens of *Thelyphonus giganteus*, a species midway between the scorpions and the spiders, from Florida, and contributed notes. Also, he showed specimens of *Polistes annularis* and a nest. Mr. Turner, a varied series of *Noctua xanthographa*, including a black form, a pale form, a red form, and a form with unusually well-defined stigmata; a very dark *Agrotis segetum* from Kent; a *Triphæna pronuba* with a remnant of a discoidal spot; and two bred *Acronycta aceris* with the veins of the secondaries deeply lined with black. Mr. Montgomery, specimens of *Noctua diatrapezium* from South Yorks. Mr. Barrett, very long and varied series of *Tephrosia biundularia* and *T. crepuscularia*, and sought to establish the identity of the two forms. After considerable discussion, it was decided to adjourn the matter for further consideration at the next meeting, to give members the opportunity of exhibiting their own series. October 8th, 1896, Mr. T. W. Hall, F.E.S., Vice-President, in the chair. Mr. Ficklin exhibited several species of Lepidoptera set in their natural positions of rest, thus showing the pattern of the transverse markings which adapted them to their surroundings. Mr. Carpenter, a male specimen of *Polyommatus* (*Lycæna*) *icarus* with a completely bleached hind wing, from Folkestone; several female examples of *Pararge megæra*, bred from Ranmore Common, having a tendency to form a broad, black, medium band; and a bred series of *Chrysophanus* (*Polyommatus*) *phlæas*, from Abbot's Wood, having well-developed blue spots on the secondaries. Mr. H. Moore, two large species of Orthoptera from Florida, viz.: *Romalea microptera* and *Cyrtacanthacris subsittaca*. Mr. John T. Carrington, *Calophasia platyptera*, Esp., a species of moth new to Britain, taken by himself between Shoreham and Brighton on September 14th, 1896. The species is closely allied to the "shark moths." Mr. Ashdown, a specimen of the rare Coleopteron, *Molochus minor*, from Mickleham, and a black var. of *Toxotus meridianus*, from Surrey. Mr. Adkin, a bred series of *Calocampa vetusta*, from Sutherland, and a bred second brood of *Acidalia virgularia* (*incanaria*), from Brockley. Mr. Lucas, an apparently hitherto unnoted variety of *Pyramius* (*Vanessa*) *atalanta*, having the indistinct deep black blotches which are anterior to the red marginal band of the hind wings, with well-marked blue centres. It was captured at Claygate by Mr. H. L. Hearsum, of Kingston. Mr. Barrett, a pupa-case and cocoon of *Pamphila* (*Hesperia*) *comma*, which had been found by Mr. Hamm, of Reading, and also some eggs which had been deposited on stems of grass by an observed female. A discussion took place as to what was the usual food-plant of the larva of the species. The general opinion was that it is a grass feeder, as are most Pamphilids. Mr. C. A. Briggs, a fly taken from a starling, presumably *Ornithomyla avicularia*, one of the Hippoboscidæ infesting birds. Mr. H. J. Turner, a living specimen of *Uropteryx sambricata*, taken in his garden on October 8th, and no doubt an individual of a second brood. The following arrangements have been made for coming meetings of this Society: October 22nd, a discussion on *Tephrosia biundularia* and *T. crepuscularia*, opened by Mr. C. G. Barrett, F.E.S.; November, 12th, "Notes made during my holiday on *Acidalia marginipunctata*, and on the earlier stages of the second brood of *Lycæna argiolus*," by Mr. R. Adkin, F.E.S.; November 26th, an Exhibition of varieties of all orders (friends and visitors cordially invited); December 10th, "Notes on the North American *Agrotis subgothica*," by Mr. W. Mansbridge, F.E.S. —*Hy. J. Turner, Hon. Report. Sec.*

North London Natural History Society.—On Monday, August 3rd, 1896, this society made an excursion to Tunbridge Wells. Travelling by the 8.45 excursion train from Cannon Street,

the party arrived at Tunbridge Wells about eleven o'clock, and immediately proceeded to the house of Mr. George Abbott, M.R.C.S., Secretary of the South-East Union of Scientific Societies, who had kindly consented to lead the excursion. The first move was to a small museum, kept going by the local Natural History Society, and containing many attractive geological specimens, but principally interesting on account of an admirable collection of living wild flowers. The party next went on to the common, where Mr. Abbott pointed out the lesser dodder (*Cuscuta epithymum*), parasitic on the furze and heather. Geology was then the order of the day, and the rocks at the far end of the common were shown and commented on by our guide, who subsequently utilized several building cuttings to explain the geological formation of the district. Our route now lay round by Hurst Wood on to Rusthall Common and to the Toad Rock, which Mr. Abbott also explained as a perfectly natural formation, being composed of a harder substance than the strata by which it was formerly surrounded, and which had been weathered away. Some people, however, believe this rock to be a relic of an ancient sphinx. Leaving Rusthall, we made for the High Rocks Hotel, and in the lane leading thereto found *Lactuca muralis* growing abundantly on the old walls and hedgerows. Up to the present, the only lepidoptera seen had been a few specimens of *Lycæna icarus* and *Pararge megaera*, together with some Heaths and Meadow Browns. But now Messrs. Bishop and Bacot plied the hedges with their beating-sticks to some purpose. A good specimen of *Zonosoma porata* fell to the net of the former gentleman, and an unusually finely-marked example of *Asthena candidata* to Mr. Fuller. Shortly afterwards Mr. Bishop captured another *Acidalia*, which no one of the party was able to certainly name, but which it was thought might be a nice var. of *A. aversata*. About the same time, the Secretary took a specimen of *Eubolia bipunctaria* from a fence. After lunch at the High Rocks Hotel, the party started for Broadwater Forest. Coming out on to a breezy heath, it was discovered that a few specimens of *Lycæna ægon* were flying among the innumerable *L. icarus*. At the same time Mr. L. J. Tremayne beat a male *Drapana binaria* from a small birch tree, and several fine examples of *Polyommatus phloeas* were taken. Meanwhile the botanists collected *Epilobium angustifolium*, *Scutellaria minor*, *Narthecium ossifragum*, *Solidago virgaaurea*, *Ulex nanus* and *Serratula tinctoria*, upon which *Cuscuta epithymum* again occurred. *Rhamnus frangula* was also noted. On descending towards the Eridge Woods, a ditch lined with *Blechnum* gave the first indication of what was to come in the way of Filices. A small piece of marshy ground, thickly sprinkled with *Lastrea*, was next traversed, where careful search was made for specimens of *Drosera* and *Gentiana pneumonanthe*, but, owing to the dryness of the season at the period, none were found. The leaves of *Viola palustris* were plentiful here. Then, entering the woods, the party suddenly found themselves in the midst of a perfect wealth of most beautiful ferns. *Lastrea filix-mas*, *L. dilatata*, *Ethyrium filix-femina*, were all represented, together with *Blechnum spikant*, and, apparently, several species of *Asplenium*, whilst *Polypodium vulgare* grew on the rocks above. The finest and most noticeable species was the lemon or hay-scented fern (*Lastrea aemula*), which was growing in the greatest beauty and profusion. Afterwards, the party visited Eridge Rocks, by kind permission of the Marquis of Abergavenny, stopping on the way to collect the tiny *Radiola millegrana*, which was found growing abundantly in one or two spots. The whortleberry was also noticed sparingly here. The rocks, and the beautiful scenery around them, were much admired. A remarkable feature about these rocks is the curious honeycomb formation on many of their surfaces, caused by series of small circular holes, each having a slight upward tendency. Traces of this honeycombing are found in nearly every set of rocks throughout the Tunbridge Wells district, but the best examples of it are to be seen on the road from the Wells to the High Rocks Hotel. Mr. Abbott said the phenomenon was quite inexplicable. A dead pine tree, completely riddled with small holes, apparently the work of some beetle, was also inspected at the Eridge Rocks, and then, after tea at a neighbouring inn, the party enjoyed a quiet and pretty walk of about three miles back to Tunbridge Wells. Then there was another adjournment to Mr. Abbott's house, where our host, besides providing light refreshments, showed us over his fernery and collection of curiosities. The latter were principally geological, and included some curious specimens of naturally-formed iron piping surrounded by and filled with sand from the Folkestone beds at Oxshott. The members subsequently returned to London in good time. The heartiest thanks were tendered to Mr. Abbott for the trouble he took over this excursion. The programme was admirably arranged and carried out, and seemed to leave time for loitering just in the right spots. The weather was fairly fine throughout, and the ramble was one of the most varied and interesting ever taken by the Society.—Thursday, August 27th, 1896.—Mr. S. Austen, Treasurer, in the chair. After numerous exhibits and observations, Mr. Quail read a paper entitled, "Neuratian: Observations and Remarks in reference to the Rhopalocera," in which he went carefully through the present families, and stated that there was no solid foundation for considering the Rhopalocera to have evolved from the super-family Zeuzerides. He endeavoured to show that there were at least three primary groups: Papilionidae, Pieridae, and Nymphalidae. The most ancient of the Pieridae were the Anthocaridi, and from these have probably evolved the present Pieridae, and (possibly) the Lycaenidae, which Mr. Quail felt justified in considering closely connected with them. Among the Nymphalids, the common ancestor was probably in or near the tribe Danaidi, and from this, Argynnidi, Vanessidi, Nymphalidi and the Satyrinae seem to have evolved. A lengthy and interesting discussion ensued.—Thursday, September 10th, 1896.—Mr. J. Wheeler, Vice-President, in the chair. After a number of exhibits had been examined, Mr. Harvey opened a discussion on "The Emerald Moths." He gave a short life-history of each species, and said it was a remarkable thing that nearly all the larvæ, though hatching so early in the autumn, go through the winter in a very small state, and do most of their feeding afterwards. Mr. Nicholson suggested the possibility of a second brood of *Iodis lactiaria*. Mr. Quail referred to the discovery of a pink variety of *Metrocampa margaritaria* on the Continent. Mr. L. J. Tremayne enquired as to the likelihood of the extermination of *Phorodesina smaragdaria* in its present restricted haunts, and if any special means had yet been discovered of preserving the delicate colour of these beautiful moths. Mr. Simes referred to the discovery of *Phorodesina smaragdaria* by Mr. Tutt

in the High Alps, a find which Mr. Harvey subsequently characterized as very curious, considering the location of the insect here.—The fifth annual Pocket Box Exhibition was held September 24th, 1896. Mr. L. J. Tremayne exhibited *Vicia tetrasperina*, *Torilis nodosa*, *Barum segetum*, and some curious and unnameable specimens of *Epilobium* from Leigh; also living examples of *Lastraea aemula* and *Hymenophyllum tunbridgense*, from Tunbridge Wells. Mr. R. W. Robbins showed butterflies from Lucerne, including *Parnassius apollo*, several species of *Erebia*, *Lycaena*, etc., also British Lepidoptera, including *Bombyx trefolii*, from Lyndhurst, *Stauropus fagi* from Oxshott, etc.; also plants from Lucerne, Selborne, Boxhill, etc. Mr. Battley had specimens of *Sesia chrysidiformis*, *Tapinostola bondii*, *Xylophasia sublustris*, *Lithosia griseola*, *Eupithecia coronata*, and *Acidalia imitaria* from Folkestone, and *Lithosia complana*, *L. mesomella*, *Minoa murinata* and *Henninia derivalis* from Canterbury.—*Lawrence J. Tremayne, Hon. Secretary.*

LAMBETH FIELD CLUB AND SCIENTIFIC SOCIETY.—The Annual Soiree and Exhibition was held on Monday, October 12th, at the Lambeth Wesleyan School, and was well attended in spite of unfavourable weather. A varied collection of objects was shown, among which may be specially mentioned varieties of *Helix nemoralis* and *H. hortensis*, by Mr. Carrington; living reptiles, Mr. Crow; Lepidoptera, Mr. Chadwick; fungi, Mr. Rivers; botanical specimens from Manitoba, Miss F. Winstone; African curiosities, Mr. Sauzé; and a series illustrating the development of the "jumping bean," Mr. Yeatman-Woolf; physical science was illustrated by a Wimshurst machine, Mr. Baker; the electric spark under the microscope, Mr. Keane; the production of acytelene gas, Mr. Caffrey; the telephone, Mr. Stokes; and the spectroscope, through which the spectra of Argon and Helium were shown, Mr. Denton. An especial source of attraction was the demonstration of the "X" rays, kindly given by Dr. Rose; photographs were taken by the rays, and visitors were shown the bones of their hands on the fluorescent screen. A short lecture on the Felidæ was given by Mrs. Rose; the subject was treated from an evolutionary standpoint, and it was explained that the apparently conspicuous stripes of the tiger and spots of the leopard were really excellently adapted for concealment in the jungle or forest.—*H. Wilson, Hon. Sec.*, 14, *Melbourne Square, Brixton.*

## NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, at the rate of 6*s*. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicate only to be sent, which will not be returned. The specimen must have identifying numbers attached, together with locality, date and particulars of capture.

ALL editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

MERTHYR GUEST (Henstridge) asks if it is really true that a tap on the top of a freshly-boiled egg prevents it from getting hard while cooling. If this is a fact, what is the explanation?

### EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

SCIENCE-GOSSIP, 1875 to June, 1888, unbound, in good condition. What offers?—J. F. Greenway, 11, High Street, West Bromwich.

WANTED, SCIENCE-GOSSIP for December, 1887, and January, 1888 (Nos 276 and 277); one shilling each given.—R. Williamson, 3, Keir Street, Pollokshields, Glasgow.

DUPLICATES.—Semele, ægeria, ægon, argiolus, lucina, paphia, piniaria, decolorata, palumbaria and 100 others; also 500 species of Coleoptera. Desiderata, numerous and foreign stamps.—A. Ford, 48, Rugby Road, Brighton.

SCIENCE-GOSSIP for 1892, January number missing; 1893, numbers for September, October, November and December missing, and Vertigo pusilla, V. alpestris, V. substriata, Pupa anglica and other rare shells offered in exchange for Vertigo minutissima, V. angustior, V. moulinsiana, Succ. oblonga, Lim. involuta and others, or foreign land shells and postage stamps.—A. Hartley, 14, Croft Street, Idle, Yorkshire.

"QUEKETT MICROSCOPICAL CLUB JOURNALS," 1884-1891; Prantl and Vines' "Text Book of Botany"; Wiedersteim's "Comparative Anatomy of Vertebrates." What offers? Wanted, Echinoderms, foreign shells, etc.—H. W. Parritt, 8, Whitehall Park, N.

OFFERED, "The Thinker," last volume unbound; "The Liver Fluke," Halse; "Handbook of Mosses," Bagnall; "Sa Cle de la Flore de Suisse et de Savoie." Desiderata, British and European shells.—A. Loydell, 19, Chaucer Road, Acton, W.

EXOTIC shells, marine and terrestrial, from Australia and elsewhere, for exchange.—W. Turner, Liberton, Edinburgh.

OFFERED, SCIENCE-GOSSIP, January to October, 1892, January to May, 1891; "Field Club," January to May, 1894. Wanted, Blackboard compasses, sign-writer's brushes.—S. W. Heaton, 53, Cassland Road, Hackney.

OFFERED, minerals, fossils, British and foreign shells, polished geological, Devonian and other specimens, microscopical slides, material, SCIENCE-GOSSIP, 1890-1895 (few unpublished). Desiderata numerous.—A. Sclater, Northumberland Place, Teignmouth.

A LARGE number of natural history books and magazines for disposal, including back volumes of SCIENCE-GOSSIP, "The Entomologist," etc.; list on application. Wanted, store boxes or offers.—W. Harcourt-Bath, 198, Winson Green Road, Birmingham.

OFFERED, SCIENCE-GOSSIP for 1896, unbound, fair condition. Wanted, natural history specimens, curios, or antiquities.—F. G. Bing, 3, Brafferton Road, Croydon.

WANTED, mosses, Myromycetes and micro fungi in exchange for slides, chiefly botanical.—E. Chas. Horrell, Royal College of Science, South Kensington, W.

MICROSCOPE SLIDES.—A number of selected diatoms for disposal, either sale or exchange.—J. B. Bissell, 8, Elmgrove Road, Bristol.

LANTERN slides from micro slides given in exchange for micro slides of any description. Diatoms and entomological specimens wanted, also microscopic apparatus; will exchange camera.—R. Borrows, 18, Pensbury Street, Darlington.

WANTED, Helix obvoluta, Bulimus montanus, and other shells or birds'-eggs. Offered, Vertigo pygmæa, V. edentula, etc.—W. Gyngell, 5, Murchison Street, Scarborough.

FOR exchange, White's "Natural History and Antiquities of Selborne," 1813 quarto edition, complete, in first rate condition and original binding.—E. A. Martin, 69, Bensham Manor Road, Thornton Heath.

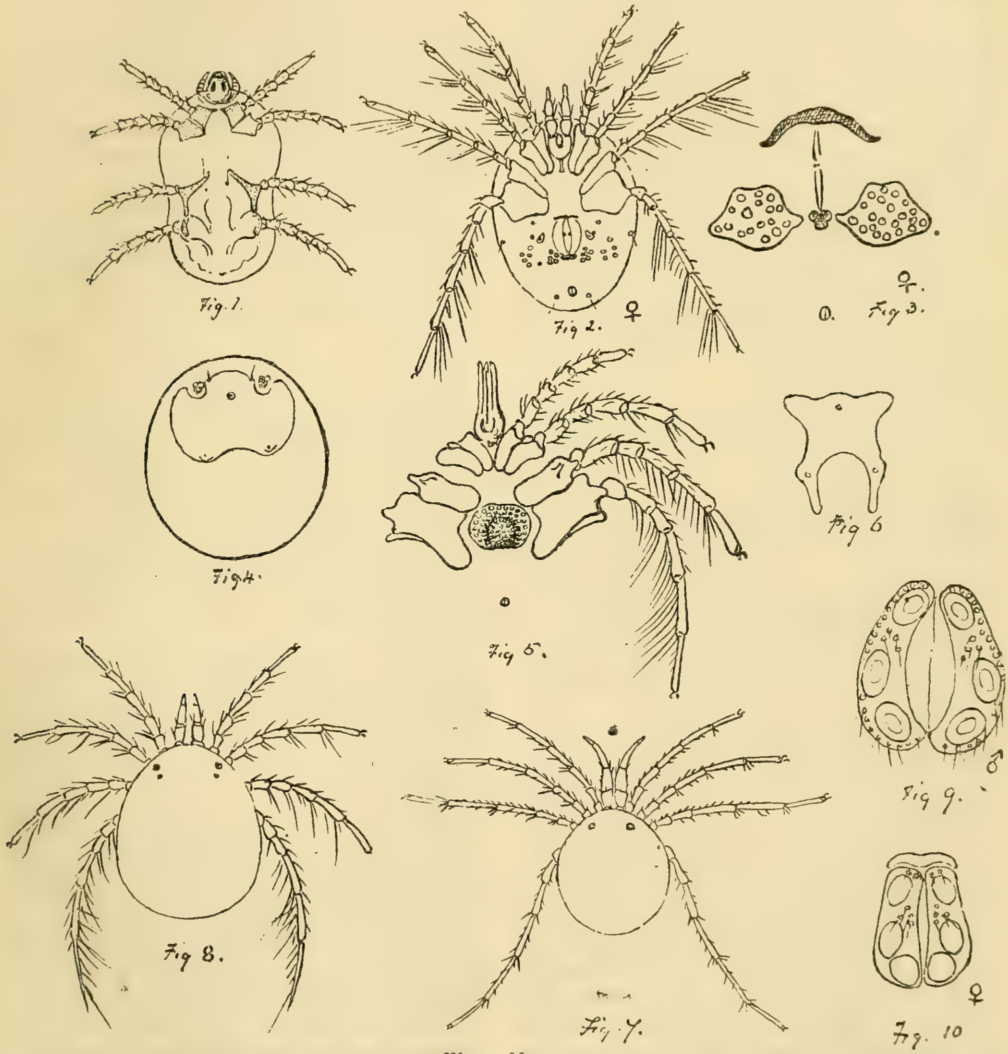
HELIX ARBUSTORUM, H. cantiana, H. hortensis, vars. incarnata and lilacina, H. lapicida, H. nemoralis, vars. libellula, castanea and rubella, Bulimus stutchburzi, Pupa, Uva, etc. Wanted, others not in collection.—W. Domaille, 37, Argyle Road, St. Paul's, Bristol.

FOR exchange, lesser kestrels, mealy redpoles, downy and hairy woodpeckers, black and yellow-billed cuckoos, Barbary partridges, killdeer plovers, common and spotted sandpipers, noody and sooty terns, etc.—Thomas Raine, Woodland View, Chapel-Allerton.

# WATER-MITES OF FOLKESTONE WARREN.

By Charles D. Soar.

At the east end of the fashionable watering-place on the Kentish coast, so well-known as Folkestone, is a wild, rugged piece of land called the Warren, well-known to most visitors to that delightful resort. It extends from the East Cliff, Folkestone, alongside the sea towards Dover for about two miles. The northern side is walled in by a high chalky cliff, which reaches as much as 450 feet above sea-level. This rugged undercliff, no doubt was formed in the first instance by an enormous landslip. It is of great wildness and beauty, the surface is undulating, no part is flat; it is all hillocks and hollows, clothed with a beautiful green herbage, and in places thickly covered with brambles and thickets. There are a few small trees, but very few. To the naturalist the Warren has particular attractions. Geologists, entomologists and botanists can spend time here




Water-Mites.

Fig. 1, ventral surface of *Limnochares holosericea*; fig. 2, ventral surface of *Nesaea pulchra*; fig. 3, genital area of *Nesaea convexa*; fig. 4, *Hydrachna cruenta*, showing hard chitinous piece behind and between eyes; fig. 5, epimera and legs of one side of same; fig. 6, *Hydrodroma helvetica*, shape of plate; fig. 7, dorsal surface of male *Hygrobates hemisphaericus*; fig. 8, dorsal surface of *Limnesia fulgida*; figs. 9 and 10, genital areas of male and female of same.

to great advantage in collecting. One cannot go to the Warren at any time of the summer season without finding some votaries of some of the natural sciences pursuing their hobby: geologists with their hammers, entomologists with their collecting nets, and the botanist with his tin vasculum.

At the bottom of several hollows in the Warren, are some small ponds of water, and it was to these ponds during August I paid several visits. Pond life in the Warren has, I believe, received a good deal of attention from some microscopists and other naturalists; but I cannot find that any person has yet recorded the Hydrachnides found there; so it is to this interesting family of the Acarina, I now wish to draw attention.

In August, 1894, I was staying at Folkestone. During that time I paid several visits to the Warren and collected all the Hydrachnides I could. As I did not think I had found anything like all the species that occurred there, I contented myself with making drawings and keeping a record of what I did find, making up my mind at the first opportunity to complete what I had then begun.

This opportunity came in August this year. I have done all I can to make the list as complete as possible, but with all the time I have spent there it is quite possible I may still have left some species in the ponds undiscovered. If so, some other naturalist, perhaps a member of the Folkestone Natural History Society, or Microscopical Society, will be able to add to those species I now record. There is one male red *Arrenurus* I should have liked to have taken. I found the female, but I cannot, without the male, give its name, so I shall have to leave this one out of my list.

There are in all about five small ponds of fresh water more or less covered with the common duckweed. These ponds are close together; the largest does not cover more than a hundred square yards of surface, but small as they are, they teem with life. I have visited these ponds a great many times, and spent hours at each, so as to make the collection of water-mites as exhaustive as possible. I found representatives of ten distinct genera, of which I give the list below. Where a figure has already been given in England, and is easily accessible to all lovers of natural history, it will not be necessary to repeat that figure again, but only refer to the reference. Of others I propose to give an outline drawing to assist identification. The ordinary collecting-net with glass tube at bottom was used. The greater number of mites were kept alive and examined on my return to London.

GENUS I.—*Eylais* (Latreille). Fourth pair of legs without swimming-hairs. Eyes in centre of body.

*Eylais extendens* (Müller). A large red mite, very common in the largest pond. It is easily recognized by its having two pairs of eyes close together; a small figure is given in "The Micrographic Dictionary," 1883, plate 6, fig. 28, which shows this mite very well, but the hairs on the fourth pair of legs are drawn too long. This species is not the Hydrachnid figured in SCIENCE-GOSSIP under this name in 1885.

GENUS II.—*Limnochares* (Latreille). All legs without swimming-hairs. Eyes in centre of body.

*Limnochares holosericea* (Latreille). Red crawling mite, very difficult to draw, on account of its continual change in shape; common in same pond as above. Ventral surface (fig. 1).

GENUS III.—*Diplodontus* (Duges). Palpus short and nipper-shaped, four eyes, two ventral and two dorsal; soft-skinned, swimming-hairs.

*Diplodontus despiciens* (Müller). Very brilliant-coloured mite; varies much in size. Common at the Warren in 1894, but not this year. For figure and description, see "International Journal of Microscopy," October, 1896.

GENUS IV.—*Arrenurus* (Duges). Swimming-hairs, body chitinous, depressed line on dorsal surface, epimera in three groups.

*Arrenurus caudatus* (De Geer). A beautiful tailed mite, common in first pond from East Cliff. See Dr. George's figure in SCIENCE-GOSSIP, 1882, p. 273, under name *A. buccinator*. The female is figured in SCIENCE-GOSSIP, 1883, p. 36.

*Arrenurus viridis* (Duges). Not common at the Warren, I only took a single male specimen, see Dr. George's figure in SCIENCE-GOSSIP, 1882, p. 273, fig. 210.

GENUS V.—*Nesaea* (Koch). Swimming-hairs, body soft, epimera in four groups, numerous genital suckers on each side of genital fissure.

*Nesaea pulchra* (Koch). A dark yellow mite with pale-blue legs. Rather common. Fig. 2, ventral surface.

*Nesaea convexa* (Koch). A large dark-yellow mite with a red mark on dorsal surface, short palpus. Fig. 3 is the genital area only, the structure of this species otherwise being very similar to fig. 2. The legs are a blue colour, dark.

GENUS VI.—*Piona* (Koch). Swimming-hairs, body soft, epimera in four groups. Three genital pores on each side of the genital figure.

*Piona ovata* (Koch). Dark-yellow with black markings, blue legs. For figure see "International Journal of Microscopy," July, 1896. It will be noticed that species of this genus are very much like species of genus *Nesaea*. That is so, but for two distinctive features: three pores on each side of genital fissure, and a small peg on palpi near the fifth joint.

GENUS VII.—*Hydrachna* (Müller). Swimming-hairs, body soft, epimera in four groups, mouth organs projected as far forward as palpi.

*Hydrachna cruenta* (Müller). This Hydrachnid can easily be mistaken for *Hydrachna globosa*. If after the mite is killed, it is soaked in a five per cent solution of formalin, the colour will in a great measure be taken out of the body, except in a hard chitinous piece which is situated just behind and between the eyes (see fig. 4). It is this hardened piece of skin which shows it to be *H. cruenta* (Müll.) and not *H. globosa* (De Geer), the latter having two chitinous patches, one behind each eye. The epimera and legs of one side are given in fig. 5.

GENUS VIII.—*Hydrodroma* (Koch). Similar to above genus, but with a shaped chitinous plate on the anterior portion of the dorsal surface.

*Hydrodroma helvetica* (Haller). Another red mite with a plate of chiten which stands out in relief on the surface, which is not so in *Hydrachna*. Fig. 6 is the shape of the plate of this species. This mite was very common in 1894, but this year I only took two specimens in the nymph stage.

GENUS IX.—*Hygrobates* (Koch). Body soft-skinned. Legs well supplied with short swimming-bristles, epimera in three groups. Three genital suckers on each side of the genital fissure.

*Hygrobates hemisphaericus* (Koch). A yellow mite, with pale-blue legs. I think these were always supposed to be river-mites, but I have taken a great many from ponds. Fig. 7 is dorsal surface of a male.

GENUS X.—*Limnesia* (Koch). Body soft-skinned. Fourth pair of feet without claws. Three genital suckers on each side of genital fissure.

*Limnesia fulgida.*—(Koch). Dark-red mite, with blue legs and epimera (see fig. 8.). Fig. 9 is the genital area of the male, and fig. 10 is the genital area of the female.

This completes the list, as far as I have been able to collect. It may be, as I have previously said, I have not found all the Hydrachnides in the Warren. I shall be very much obliged to anyone finding others, if he will kindly send me on a specimen.

1, *Sussex Villas, Kensington, W.*

## THE FLORA OF ARCTIC NORWAY.

BY JOHN CORDEAUX, M.B.O.U.

IN August last I was a passenger from Bergen to Vadsö, a small port in the Varanger Fjord, in East Finmarken, on the Bergen Steamship Company's ship "Neptune." The party on board was a large one, the primary object of this special expedition being to witness the total eclipse of the sun on August 9th. Opportunities were given us, both on the outward and return journey, to land for a few hours at various places of interest on the coast. At Vadsö, our ship remained from the morning of the 7th to the afternoon of the 9th of August. On the 8th, we visited a whaling station on the Jar Fjord, only a few miles from the Russian frontier. Here, and on the moors and tundra north of Vadsö, I got the plants named in this list—comparatively it is a meagre and very imperfect one, from the limited time at my disposal, also from the lateness of the season, so many plants being out of bloom. At the same time it was most interesting, as an ornithologist, to be able to study the flora of the Arctic tundras, the breeding-haunts in the summer of such vast multitudes of European birds.

In making this small collection of plants, I was greatly indebted to one of our party on board the Neptune—Miss May Roberts, of 8, Manchester Square, a specialist in cryptogamic botany. I have also to thank Mr. Edmund G. Baker, of the British Museum, for his kindness in naming several plants I was in doubt about; these are marked with an asterisk in the list; also I am indebted to the Rev. E. Adrian Woodruffe-Peacock, of Cadney, Lincolnshire, for going through the plants with me and revising the list.

### PLANTS AT VADSÖ AND THE JAR FJORD. August, 1896.

* *Salix ambuscula*; *S. herbacea*; *S. lanata*; *S. glauca*; *Betula nana*; * *Juniperus nana*; * *Empetrum nigrum*; *Vaccinium vitis idæa*, with magnificent clusters of scarlet berries, and leaves also bright scarlet after frosts; * *V. myrtillus*; * *V. uliginosum*; * *Arctostaphyllos alpina*; * *Cornus suecica*, both berries and occasionally blooms; * *Rubus chamæmorus*, fruit most abundant.

Nothing caused me more astonishment than the abundance and luxuriance of berries on these last eight fruit-bearing plants. In some places the delicious fruit of the cloudberry, the Norwegian "Multibær," gave a colour to the ground. It seems the commonest plant on the tundra. In a few weeks from August 9th all this profusion of small fruits will be buried deep in snow, but it is not wasted, and remains sweet and uninjured beneath the white mantle till the thaws of spring, when they will afford an inexhaustible supply of food, before any insect life is available, to countless hosts of migratory birds.

*Rubus arcticus*, in flower, but no fruit found. There is no more lovely blossom in these wilds than the Arctic bramble, rose-coloured on a short, slender

stem; the ternate leaves turn to scarlet and purple with the first touch of frost. *Dryas octopetala*, in seed, an occasional flower; *Silene acaulis*, also in seed, with occasional flowers; *Alchemilla alpina; Comarum palustre; Linnæa borealis*, in flower, fairly common in thickets of willow and *Betula nana* on the moors; * *Cerastium trigyanum; Parnassia palustris;* * *Polygonum viviparum;* * *Pyrola rotundifolia;* * *Menziesia polifolia;* * *Solidago virgaurea;* * *Ranunculus acris;* * *Antennaria dioicum;* * *Tofieldia palustris;* * *Saxifraga stellaris; S. nivalis*, rare, *S. stellaris* is the commonest of the two; *S. aizoides*, **Andromeda polifolia;* **Gedum palustre;* **Bartsia alpina;* **Drosera rotundifolia;* **Dianthus superbus*, on rocks, at Jar Fjord, well called superb by Linnæus; **Holosias scoticum;* **Arabis petræa; Trientalis europœa; Saussurea alpina; Narthecium ossifragum; Caltha palustris; Habenaria viridis.*

To botanise on an Arctic tundra is no easy task, it is a hop, skip and jump from one peaty lichen-covered (and the lichens are lovely with tints of scarlet, sea-green and rich bronze) stool to another; a slip, and you plunge knee deep into the boggy soil between. Then there are great, smooth, level spaces thinly covered with aquatic vegetation, where the water shines in places and the depth of the trembling bog is unknown; these have to be skirted and long detours made, for one false step might be disastrous, and, if alone, a veritable death-trap. The stony moors are excellent walking, but beware of the bogs in the shallow valleys between the low hills.

In Hornvik Bay on Slopes of North Cape.—*Saussurea alpina; Rhodiola rosea; Vicia cracca*, extraordinary fine clusters of bloom; *Trollius europœus*, in seed; *Ranunculus nivalis; Solidago virgaurea; Epilobium augustifolium; Campanula rotundifolia; Cochlearia officinalis; Archangelica officinalis; Astragalus alpinus.* Here, at the most northerly point of Europe, these plants were growing in the greatest luxuriance on the green, swampy slopes on the north-east side of the Cape.

At the Birdrock (Hjelmso), both *Cochlearia officinalis* and *Silene maritima* in detached patches on the rocky ledges.

Svartisen Glacier, Holands Fjord.—On the terminal moraines of the glacier many of the Vadsö plants, *Dryas* and *Silene*, specially abundant; besides these, **Gentiana campestris*, a white variety, quite as common as the purple; **Aconitum septentrionale; Galeopsis versicolor, Campanula rotundifolia*, the finest and largest flowers of this plant I have ever seen; *Spiræa ulmaria; Polystichum lonchitis*, Alpine holly fern; * *Mertensia maritima*, spreading in great patches on the gravel shore of the fjord; the small flowers are a most beautiful deep marine blue, rivalling the colour on the blue-striped wrasse of these waters. This plant grows also on the shores of Spitsbergen.

Trondhjem, Lerfos. — * *Saxifraga cotyledon*, "Berg-kongen"—King of the Rocks; on boulders and rocks wet with the spray of the falls this lovely saxifrage waves its spikes of snowy blossoms; *Campanula latifolia.*

At Voss.—*Lycopodium annotinum;* in the pine woods the ground is carpeted with this handsome club moss, mixed everywhere with the trailing stems of *Linnæa;* here, like little haycocks, scattered through the woods, are the huge ant-hills of *Formica congereus*, only found in one place in Great Britain—the Black Wood of Rannock, in Perthshire. *Smilacina bifolia*, like a dwarf lily o the valley, and peculiar to Norway; **Knautia arvensis*, in meadows; *Linnæa borealis*, but no flowers, as at Vadsö; *Vaccinium vitis idæa; Cornus suecica.*

*Great-Cotes House, R.S.O., Lincoln;*
*October 29th; 1896.*

## HOUSEHOLD INSECTS IN THE UNITED STATES.

THE U.S. Department of Agriculture have issued a well-illustrated pamphlet on "The Principal Household Insects of the United States." The numerous household pests are dealt with under different chapters by various authors, the first being on mosquitoes and fleas, by Mr. L. O. Howard. He thinks the only effectual remedy for mosquitoes is the destruction of the larvæ or breeding places by means of kerosene. Dust appears to be particularly favourable for the breeding and development of *Pulex serraticeps*, Gervius, the cat and dog flea, which is the common one in most parts of the world. As a remedy against the troublesome clothes moth, the authors, Mr. L. Howard and Mr. C. L. Marlett recommend camphor, napthaline, or cedar chips. These are only effectual if the eggs of the moth have not already been laid, as their odour is repellent to the moths, but does not retard or in any way affect the development of the larvæ, which are the actual destructive agents, the moths being quite harmless to clothes. The authors suggest as an excellent, though not always possible, preventive against moths, keeping furs and clothes in a temperature of from forty to twenty degrees Fahrenheit. The best remedy for the English cockroach, the trouble of so many households, is, according to Mr. Marlett, to place small cones of moistened gunpowder in an empty fireplace and light them. The smoke from the burning powder will make the roaches come out of the crevices in great numbers and rapidly paralyzes or kills them. A common tree frog placed in a room will do much towards clearing it of cockroaches by the morning. The book-louse, white ant, house ant, cheese, ham and flour mites, the larder beetle, fruit and vinegar flies, etc., are described, and remedies proposed.

# BIOLOGICAL JOTTINGS.

By Rudolf Beer, F.L.S.

## I.—The Cell.

TWO years ago Professor Max Verworn, writing of modern physiology, said: "The theory of the cell has long since disclosed that the cell is the elementary foundation-stone of the living body, the 'elementary organism' itself. . . . If physiology regards it at all as her task to inquire into the phenomena of life, she must seek these phenomena at the spot where they have their origin, at the focus of life-processes, in the *cell*." These words of one so well qualified to speak as Verworn, are sufficient to show what an important part of biology, Cytology, or the science of the cell, has become.

Unfortunately we have attempted to run before we could walk, and have, consequently, almost swamped the science with a deluge of theory. We cannot altogether wonder that this should be so. From time immemorial, man has felt a burning curiosity with regard to the nature of life, and when at last he has tracked the phenomenon to the narrow compass of a cell and is brought to a pause by the incapacity of his present means of research, can we be surprised that he should be impatient of delay, and should stretch out his hands beyond the curtain which divides the known from the unknown? Nothing can be more useful to science than a working hypothesis, but when, by frequent repetition, we forget that we are dealing with a theory and take it as a recognized fact, we fall into one of the most grievous errors that await a man of science. Upon one theory we shall then proceed to build another, and bit by bit, we shall weave a complicated network of dreams, with here and there, perhaps, a distorted fact twisted in until at last the whole baseless fabric of this vision topples over like a house of cards and "leaves not a rack behind," except the bitter knowledge that we have wasted so many valuable years over empty speculations.

All this will seem very trite, but unfortunately it is too often forgotten, especially in cytology, where too much time and attention is given to quibbles about visionary biophors and idiosomes, which exist only in the minds of their upholders. All that can be said so far with any certainty is that the smallest unit capable of independent life is the cell. But even that very word "cell" is surrounded with confusion due to the many changes of meaning which it has passed through since its introduction into science by Robert Hooke in 1667. At one time it signified a tiny cavity like the cell of a bee's honey-comb; at another it implied the walls of the cavity, together with their contents; and more recently still, it has been used to denote the contents apart from the enclosing walls. It is in this latter sense that I employ the term in the present article.

It is better perhaps to adopt Professor Sachs' terminology and to speak of the walls and the contents of the cavity together as constituting a cell, whilst the living part of the cell-contents, *viz.*, the protoplasm (including the nucleus) is termed an "energid." To be precise, one may define an energid as a nucleus together with the protoplasm which it governs. According to this plan, some part of the original meaning still attaches to the word cell, whilst the modern ideas of a living unit are summed up in the name "energid."

Plain and straightforward as this all seems, there are, however, many things which militate against its entire success. One difficulty which has been raised against Sachs' views is the fact that protoplasm is not a quiet stay-at-home substance which can be nicely packed up around a nucleus and thus without difficulty partitioned off as a unit. It is a mobile substance, wandering in all probability through the organism. We know that in plants there is continuity of protoplasm from one cell to another (using here the word cell in Sachs' sense), and there is very good reason for thinking that the plasma touches at one moment this nucleus, and is controlled by it, but that slowly it travels away, finding a passage through the delicate inter-communicating channels leading into neighbouring cells, and is thus brought within the range of influence of other nuclei, and so on from nucleus to nucleus throughout the organism. This is not, however, a serious objection to the idea of an energid. By that term we signify a nucleus together with the protoplasm which *at any given moment* is controlled by it.

Another question which is intimately bound up with the conception of "energids," is whether there exist organisms or elemental parts of organisms which are destitute of nuclei. Some years ago numerous examples would have been forthcoming to answer this question in the affirmative. With improving means of research, however, these examples have fallen away one after the other, and at the present day it is only in three cases that there is any question at all. These are the red corpuscles of the blood, bacteria and certain members of the lowest class of algae—the Cyanophyceae. With regard to the first, all that need be said is that physiologists are pretty well agreed that the red corpuscles are to be looked upon

rather as cell-products than as cells themselves. Around the bacteria and Cyanophyceae, the battle of nucleus or no nucleus is still warmly kept up. All who have worked at this difficult subject are, I believe, agreed that in the larger bacteria and Cyanophyceae at least, there is a distinction between a delicate peripheral layer of protoplasmic (?) substance and a large central body. The matter of uncertainty is in the interpretation which is to be given to this central part. Are we to regard it, with Bütschli and Zacharias, as the homologue of the nucleus, or, with Fischer and Migula, as merely a large central vacuole? At the present state of our knowledge it is difficult to hazard an opinion either way. The entire absence of the ordinary parts of a nucleus such as the nucleolus chromatin network, etc., has been urged against the view which holds it to be a nuclear representative. When we regard the question, however, from the standpoint of evolution, is not this exactly what we should expect? In the lowliest organisms we should look for entirely undifferentiated nuclei, and only in organisms which by other signs we recognize as higher in the scale of development would we expect to find nuclei showing all the complexity of nucleolus, linin network, definitely arranged chromatin granules, etc.

To my mind the whole problem appears to turn on chemical considerations. Glancing back at the history of chemical cytology, it will be recollected that many years ago Miescher isolated from animal eells a certain material which he termed *nuclein*. This substance has been shown to be characteristic of nuclei. The recent beautiful researches of Zacharias and Rosen have shown us a remarkable connection existing between nuclear activity and the presence of this nuclein in the nucleus. It has been shown that as the power of nuclear division, which is the most apparent activity of this organ, gradually fades away, so in like proportion does the quantity of nuclein diminish. There is some reason to believe therefore that one of the necessary conditions for the display of vital activity in a cell is that nuclein should be present; and all our experience goes to show that nuclein is the characteristic substance of the nucleus. When one asks, therefore, whether a certain cell is nucleated or not the question resolves itself into the further enquiry of whether nuclein does or does not occur.

It seems to me to be no extravagant view to hold that in the simplest cell we have protoplasm in which nuclein is diffusely scattered; as phylogenetic development advances the nuclein becomes drawn together into a special body, and slowly as evolution proceeds we get produced the highly differentiated structure we are accustomed to find in the nucleus. I leave here quite out of the discussion all questions dealing with the origin or significance of the curious bodies known as *centrosomes*.

What then has to be sought for in the central bodies of bacteria and cyanophyceae is nuclein. There have been found here certain granules which resist artificial gastric digestion. This is one of the properties of nuclein and therefore lends strong probability to the opinion that these particles are of the nature of nuclein. If a sufficient array of facts can be produced to show that these grains are indeed composed of nuclein, I think every justification will be given for regarding these larger bacteria and low algæ as nucleated organisms.

In the majority of the smaller bacteria which have been examined, no distinction of peripheral protoplasm and central body can be made out, and Professor Bütschli believes that nearly the whole organism corresponds to the "central part" of the larger forms.

These are some of the problems which have to be attacked before we can satisfy our minds as to the meaning which should be attached to the word "cell." At the first glance we would imagine that no word in science was clearer or better understood; but in the hands of the numerous enthusiastic workers in cytology its significance is ever changing, as they steadily push forward towards a more philosophical ideal.

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*Elmwood, Bickley, Kent; September, 1896.*

In the "Irish Naturalist" for November there is an interesting article on "The Botany of a School Playground in the heart of Dublin," by the Rev. Thomas B. Gibson. Although the place seems an unlikely one in which to find botanical specimens, Mr. Gibson enumerates a number of plants he has found in the playground of King's Hospital, amongst others the somewhat uncommon green hellebore, *H. viridis*. He says that the ground has no unusual capabilities, nor has any attempt been made to assist growth. He has, however, scattered some few seeds himself on various occasions, but most are self-planted.

## VARIATIONS IN ORCHIS MACULATA.

By G. H. Bryan, Sc.D., F.R.S.

DURING the course of an expedition to North Wales, I was much struck with the great variety, both in the form and in the markings, of the labellum of the common orchid, *Orchis maculata*. In the British flora it appears not to be usual to distinguish the different forms as varieties, though the difference between extreme types is quite as conspicuous as the distinction between *O. latifolia* and *O. incarnata*. In their "Flore Française," however, Messrs Gillet et Magne distinguish the following varieties in addition to the typical *maculata* :—

Flowers small; labellum with three nearly equal lobes. ... ... .. *var. trilobata*
Middle lobe of the labellum elongated, the lateral ones rounded, entire ... *var. media.*

The accompanying drawings were very carefully made on the spot. It will be generally noticed that specimens growing in damp, shady places have the paler flowers, and have the edges of the lateral lobes very crenulated, the middle lobe being in some cases almost insignificant. On the other hand, dry sunny meadows and hedges seem to conduce to the development of forms possessing more regular purple markings and having the middle lobe more conspicuous, and the lateral ones often with smooth edges. There is also a considerable variability in the spots on the leaves. A complete classification of all the varietal forms occurring in this variable plant would form a pleasant task for a summer vacation.


Variations in the Labellum of Orchis Maculata.

*Cambridge; October*, 1896.

# THE EIDER DUCK.

By Robert Godfrey.

THE eider duck, *Somateria mollissima*, is a resident in the Firth of Forth, occurring in varying numbers about the islands and near certain portions of the shore. During winter this species frequents the open sea and is seldom met with near the coast line, but as the breeding season approaches, the eiders gather at their time-honoured haunts along the southern shore of the Firth and about the May Island, Bass Rock and other known resorts. From St. Abb's Head to Aberlady they occur throughout the summer in parties of from one to twelve or more pairs, being most isolated in the rocky regions of the Berwickshire coast, and most numerous off the low-lying sandy links of East Lothian. Above Aberlady they are rarely seen off shore, but have been noted in the Firth as far up as Cramond Island, though I do not positively know if they breed on that island, whilst along the portion of the northern shore most intimately known to me, between Burntisland and Queensferry, they are as yet exceedingly rare, a single pair in a quiet bay there on May 16th, 1895, being the only ones that have come under my own observation. In April, the eiders are not numerous in any one locality, but as the season advances they concentrate to one point, and in early June over fifty pairs may be counted together in their chief haunt in the Forth area, a haunt which in 1821 was reported to be a common resort of this species, and which still remains their chief home in our district.

Though my night-rambles after the scarcer nesting-species have repeatedly led me to the eiders' quarters, yet my first night in their haunts comes ever back to memory with increasing vividness. I had reached the shore shortly before midnight, and kept wondering as I roved along what bird might be the producer of the strange moaning cry that continually came from the sea; but I did not succeed in solving my difficulty till morning. By night I paced up and down amongst the herbage-covered sand-dunes, and in the dim light of morning I found amongst the rough grass an eider's nest with the eggshells broken around it, as if by some plundering birds. Shortly afterwards I came on a mass of down, betokening another harried nest, and near a ridge-top I discovered a third with down alone in it. The fourth, empty like the others, I obtained in a slight hollow. At length I saw two female eiders flying low in my direction, and in the vain hope of being unnoticed by them I lay down, but was not gratified in seeing them alight. Huge and heavy as they appeared on the wing, they flew easily enough along and made a second circuit round me, uttering a low cry at the same time, before they passed out of sight. Still I plodded on, and about four o'clock disturbed a sitting bird; with difficulty she seemed to get on the wing, and with heavy loud flapping she made seawards, keeping close to the ground as she flew. The nest, containing four eggs, was placed at the junction of a grassy and a sandy portion, and was composed of dry grass with a scanty supply of down. On the discovery of this nest I ceased my searching, and, approaching the edge of the sand-dune bordering the shore, I peered over and gazed on a sight truly splendid. Eiders, and eiders alone, were stationed on the low rocks in the foreground, and on discovering my presence they rose with a terrific clapping of wings, and soon again alighted on the water with heavy splashing. The same moaning that had claimed my attention by night was still proceeding from the large flock of birds and was accompanied by curious evolutions of the head. Both sexes were thus gesticulating, tossing up their heads with the tip of the bill pointing upwards, or occasionally downwards, and the drakes sometimes raised their breasts right out of the water. The moan resembled "ah-woe-o, a-woo," and another note "whee-whee-whee" was also frequently uttered. Further along, another eider rose heavily in front of me, and in silence made for the sea. This nest also contained four eggs and was well-lined with down, whilst a peculiar disagreeable smell, noticed in the previous instance as well, emanated from it. The eider's nest—despite the size of the contained eggs—is not a conspicuous object in these rough grass-clad links, as it is made to fit compactly into the place chosen; it is usually discovered by the birds rising at our feet.

The nest, in the Forth area, is generally near the sea, placed usually in some inequality of the wild herbage and tangled plants, or more rarely situated on a comparatively bare dune-face. In one instance an eider formed her nest on a heap of grass which had been cut and piled the previous season, and in another she had formed it in a crevice amongst bare jagged rocks. In some cases a hollow is formed in the ground beforehand; often, however, no prior preparation is made, and the large nest of grass and moss is rendered firm by the weight of the bird. The quantity of nesting material varies greatly in different instances, being sometimes almost entirely absent, as where a convenient depression has been chosen by the bird, and at other times of much grass and other plant stems from the adjoining ground. In the nest

amongst rocks referred to above, the foundation consisted of small fragments of plantain and sea-pink, upon which lay a great mass of down; it measured fourteen inches in one diameter and nine in another.

The usual clutch is four; I have found a nest with seven, and one with two, in which incubation had begun. In the nest with seven the arrangement was peculiar, for, whilst five were placed round a central sixth, the seventh lay above them, forming a second layer. The eggs are dark greyish green, the green being more or less pronounced, and are often marked with dark, greasy-looking blotches. In some eggs the arrangement of the different shades gives the appearance of a much broken and torn layer of dark green, displaying the lighter green through its gaps.

The down is added to the nest after the eggs are laid and is often so closely intermingled with the material of the nest as to make separation difficult. The flakes are large, with white centres and uniformly grey tips, and, in mass, the down is very elastic. Except when the clutch consists finally of less than four, little down appears in the nest till that number is laid. The duck sits closely, and when disturbed flies off in silence to the nearest water, or sometimes settles at a distance and stands on the grassy slope watching the disturber. When she flies direct to the sea her subsequent actions can seldom be followed, as there is generally an intervening brow. Once I roused a duck from her nest, containing an incomplete clutch of three, on the grassy slope rising from the shore, and saw her settle on the sea, when a drake immediately rose and flew to her side. The duck rested with her head on her shoulders in normal position, then performed the gesticulation peculiar to the nesting season, raising her head upward and forward and quickly retracting it again.

Many nests are robbed by vermin, but far more are taken by man, so that the continued abundance under such conditions is remarkable. On June 6th, 1895, I was examining a small rocky island, which rises sufficiently high above the water to be clad with patches of grass over its irregular surface, and, having explored the seaward half without any interruption from breeding-birds, I was returning along the landward border, when I noticed an eider appear from the side of a dirty pool and stand amongst the white bladder-campion plants and purple seapink. She walked a few steps and called in a low tone "krok-ok-ok-ok," whilst I halted in amazement, unable to understand her action. Presently I detected two young birds following her, and, giving chase, I caught one of them. The eider ran, and then flew to the sea. I discovered other three youngsters skulking by the side of the pool, making five in all, and as they were at a safe distance from the water I could have taken them all if I had wished. I kept one of them and set the others in motion. The duck flew up the island towards me and her young, and stood calling to them from a rock till she had successfully led off two of them. She swam away with them, calling the while, and ere she had gone far she was joined by the drake. The concern of the drake for the duck when her eggs or her young are in danger, as observed on this and on other occasions, leads me to think that they pair for life. After the nesting season the flocks disperse and retreat from our shores, and leave the shore-wanderer almost a stranger to their winter habits. Yet they do not entirely forsake us, and when seen afford us an opportunity of filling up details, which in summer we either failed to describe, or could not, because of the numbers of the birds. On December 25th, 1893, I found four birds, apparently a family party, at the base of Fast Castle. The party consisted of two drakes, one adult and one immature, and two ducks, whose age could not be determined, and they displayed no anxiety as they swam and dived near the land. They sat deeply on the water, and the waves rolling past them were broken in small patches of white foam by their disturbing presence. They did not rise from the water to dive, but simply curved their necks deliberately and opened their wings as they entered the sea. On every occasion the adult drake was the last to enter, and it was easy to follow his course from his brightness of plumage, as with outstretched neck he flew quickly down in a slanting direction through the water. They remained on an average thirty to thirty-four seconds beneath the surface, and after reappearing they often touched the water with the point of their bills, as if sipping. The three less conspicuous members of the group often rose on the water to shake their wings or beat the surface to splash the water over them, and ducked their heads as they thus cleaned themselves. After a while they swam in company slowly away from land.

A gamekeeper to the east of Gullane has made several attempts to rear young eider ducks by feeding them on eggs, custard and Spratt's meal, and would probably have succeeded in keeping them in perfect health had he had the necessary conditions. Seeing, however, that he has them in an enclosure, without sufficient sea water, he suffers from an inconvenience which has made itself felt in the weakness of the birds' legs, and also in gatherings about the eyes. On January 23rd, 1894, I saw two of his birds, which he had reared from the preceding season, one of which was in perfect health and plumage, whilst the other had lost all use of its legs. He was justly proud of his hand-reared birds, as he showed them to me, and I too was delighted with them.

46, *Cumberland Street, Edinburgh; October*, 1896.

# ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Continued from page* 156.)

*PLECTOPYLIS ponsonbyi* (figs. 22*a-e*), from Hlindet, Burma, was described by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society" for 1888, p, 243. My drawing has been prepared from the specimen figured by Mr. Pilsbry in "Manual of Conchology," ix. (1894), t. 40, figs. 9-12. The shell is sinistral, disk-shaped, flattened above, with the apex a little raised, composed of six and a-half whorls, closely and regularly coiled, rounded and gradually increasing; it is regularly and finely ribbed, and has the last whorl deflexed in front; the parietal callus has a raised flexuous ridge, which is separate above and below from the peristome. From the aperture may be discerned a short, free, slightly curved, parietal fold, which follows the deflexion of the last whorl (see fig. 22*a*). The parietal armature

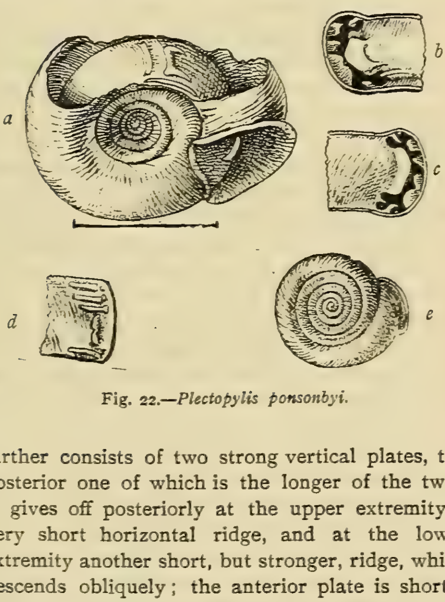
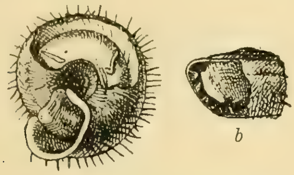



Fig. 22.—*Plectopylis ponsonbyi.*

further consists of two strong vertical plates, the posterior one of which is the longer of the two; it gives off posteriorly at the upper extremity a very short horizontal ridge, and at the lower extremity another short, but stronger, ridge, which descends obliquely; the anterior plate is shorter but much stronger and thicker than the posterior one, and it gives off two strong ridges, one from the upper and one from the lower extremity, gradually decreasing in height. Below these two vertical plates there is a very thin horizontal fold terminating posteriorly a little beyond the posterior vertical plate, and anteriorly becoming attenuated till it is scarcely visible at the parietal ridge, to which, however, it is united. In the figure referred to, I regret to find this horizontal fold is wrongly shown as terminating a little beyond the anterior vertical plate. The palatal armature consists of: first, a thin horizontal plate, parallel with and near to the suture, a little broader in the middle; secondly, a somewhat stouter plate, slanting a little downwards posteriorly, also a little broader in the middle, and decreasing abruptly anteriorly, but very slowly posteriorly, where it is slightly indented; thirdly, a similar plate, slanting a little more posteriorly, with a slight indentation; fourthly, a stout bilobed vertical plate giving off anteriorly at the upper extremity a very slight ridge and posteriorly from the base of each lobe a short ridge; fifthly, a horizontal fold parallel with and near to the lower suture, raised in the middle, with the apical portion reflexed and angular; it has a very small tooth on the posterior side. Another very small tooth is situate a little below the first horizontal plate about its middle, shown erroneously in fig. 22*d* in a line with it. Fig. 22*b* shows the whole armature from the side of the aperture, fig. 22*c* the same from behind, and fig. 22*d* the inside of the outer wall with the palatal folds (all magnified); while fig. 22*e* shows the shell restored, from above, natural size. The type specimen measures 18 millimetres in diameter, and is in Mr. Ponsonby's collection.

*Plectopylis fultoni* (figs 23*a* and *b*) was described by Lieut.-Colonel Godwin-Austen in "Annals and Magazine of Natural History" (6), x. (1892), p. 300, where the habitat of Khasi Hills, India, is doubtfully given, but the exact locality is unknown. The species was subsequently figured in Mr. Fulton's advertisements in "Nature" and "The Nautilus," and these figures were incorporated by Mr. Pilsbry in his "Manual of Conchology" (vol. ix., t. 40, ff. 13–15). As, however, the armature has not hitherto been figured, I am pleased to have an opportunity of doing so. The shell is sinistral, subglobosely disk-shaped, widely umbilicated, of a pale ochreous colour, regularly ribbed and decussated by a fine spiral sculpture; it is composed of seven or seven and a-half whorls, very slowly increasing in width, the last of which descends in front; the body whorl bears four rows of coarse hairs revolving horizontally over its whole length, the first on the keel, the second a little below the first, the third midway between the second and fourth, the latter being near the umbilical angulation. The peristome is reflexed and thickened; the parietal callus is only slightly thickened, its margin, however, is distinctly separated from the peristome above and below; the aperture is devoid of armature. The shell measures 18 to 20 millimetres in diameter. The

parietal armature consists of a single strong vertical plate (see fig. 23*a*). Lieut.-Colonel Godwin-Austen, in describing the armature (loc. cit.), states that the parietal plate has only a slight horizontal support above on the posterior side; in the two specimens in my possession, however, this plate has a similar support below; these supports consist of a tooth united to the vertical plate by a slight callosity. Below this is a short



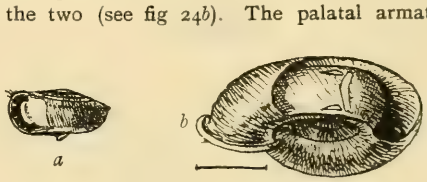
a b

Fig. 23.—*Plectopylis fultoni.*

thin horizontal plate, a little indented in the middle. The palatal armature (see fig. 23*b*) consists of: first, a short horizontal fold, close to and parallel with the suture; secondly, a longer and stouter horizontal flexuous fold; thirdly, another horizontal fold, slightly indented in the middle and deflexed posteriorly at an obtuse angle; fourthly and fifthly, two series each of two short horizontal folds, the anterior ones slightly oblique, with their lower ends towards the aperture, and the posterior ones deflexed at an obtuse angle posteriorly; and sixthly, near the base, a short slightly bent fold, with the convex side turned towards the lower suture. The specimen figured, which is not quite mature, bears a second vertical plate on the parietal wall (see fig. 23*a*), which appears to be the remnant of the immature barriers formed before the completion of the shell, for, as will be seen later on, in this genus, as in *Corilla* (see *ante* p. 90), the armature is not confined to full-grown shells, but occurs at various periods of their existence, the earlier sets of plates and folds being absorbed after the formation of the next set. A young specimen in my collection, composed of five whorls, possesses the armature a little beyond the place where four and a-half whorls have been completed; the barriers are almost identical with the mature ones, except that the folds are smaller and the second and third palatal folds are deeply bilobed. A still younger specimen of only four whorls has the armature near the place where three and a-hal whorls have been completed. *Plectopylis fultoni* is allied on the one hand to *P. andersoni* (see *ante* p. 154, fig. 17), the parietal armature being almost identical, while the arrangement and structure of the palatal folds connect it on the other hand with *P. plectostoma*, to be considered in a subsequent paper.

The species of *Plectopylis* hitherto dealt with belong to a group forming a section of the genus, the members of which, with perhaps one exception, do not occur north of the Himalayan range, but are confined to the vast tract to the south of it, comprising India, Burma, and Farther India. Before dealing with the remaining members of this section, exigencies of illustration compel me to consider the Chinese members of the genus, which constitute another section characterized by a glossy, more or less transparent shell and a somewhat less complicated armature. All the known species are dextral.

*Plectopylis fimbriosa* (figs. 24*a* and *b*), was described and figured by Dr. E. von Martens, in the "Jahrbuch der Deutschen Malakazoologischen Gesellschaft," ii. (1875), p. 128, t. 3, f. 6, from specimens collected in the Province of Kiang-si of China: it has subsequently been found in the Province of Hou-Nan. Dr. O. F. von Möllendorff, in figuring the armature of this species (op. cit. x. (1883), t. 12, f. 11), has given only the anterior aspect of the plates and folds, while my figure (fig. 24*a*) shows the posterior view. The shell is disk-shaped, with the spire a little elevated, subpellucid, corneous, composed of six whorls slowly increasing; strongly and regularly ribbed above, with a strong spiral sculpture, smoother and shining below, with a yellowish band round the wide open umbilicus; angulated on the periphery, which is provided with a fringe of coarse lacinia; the white peristome is strongly reflexed, and a little thickened, and the parietal wall is without a callus; the shell measures 15 millimetres in diameter. The parietal armature consists of a strong, simple, vertical, lunate plate, the convex side of which is turned towards the aperture, and the lower extremity is somewhat strongly deflexed posteriorly; on the anterior side are found two short horizontal teeth, one above and one below, in a line with the extremities of the vertical plate, the upper one being the stronger of the two (see fig 24*b*). The palatal armature



a b

Fig. 24.—*Plectopylis fimbriosa.*

consists of six short, simple, horizontal folds, the first near to and parallel with the suture, the second longer and stouter, nearly opposite the upper extremity of the parietal plate; the third, fourth, fifth and sixth all parallel, equidistant, and gradually decreasing in length downwards; a small tooth occurs a little above and posteriorly to the sixth fold; these folds are visible externally through the shell wall. The three specimens in my collection are from Kioo-Kiang, Province of Kiang-Si, and are all identical in armature. One

specimen is of special interest from possessing, in addition to the mature plates, the remains, partly absorbed, of the previous set, consisting of the basal portion of the parietal plate, the whole of the first palatal fold, parts of the second and fourth, and the whole of the fifth and sixth, with the adjacent tooth. Here we have, therefore, absolute proof of the absorption of the earlier armature as suggested in the case of *Corilla.*

The Rev. Vincenz Gredler described a variety of this species under the name of *P. fimbriosa* var. *azona* (Jahrb. Deutsch. Malak. Gesells, xiv. (1887), p. 369), which, subsequently, he raised to specific rank ("Nachrichtsblatt der Deutschen Malakazoologischen Gesellschaft," xxi. (1889), p. 155). In order to ascertain whether any difference in the armature could be detected, I have opened the single specimen in my collection (from Patong, West China), but with the exception of the tooth near the sixth palatal fold being absent and the palatal folds generally being a little shorter, it is identical, and I am, therefore, of opinion that this form must be regarded as a variety, as originally suggested by Mr. Gredler. It is smaller than the type, measuring only 12 millimetres in diameter, a little darker and less shining, and it is devoid of the yellowish zone round the umbilicus, so that the varietal name suggested is very appropriate. Dr. von Möllendorff has named a variety *nana*, which differs from the type in having the last whorl with a more acute peripherial angle and in being much smaller, the measurement given being 6 millimetres. I do not know this variety, and have, therefore, had no opportunity of studying its armature.

*Plectopylis pulvinaris* (fig. 25) was described by Dr. A. A. Gould in the "Proceedings of the Boston Society of Natural History," vi. (1859), p. 424, from specimens collected in Hong Kong and in

Fig. 25.—*Plectopylis pulvinaris.*

China, near Canton. It was also collected in Hong Kong by Dr. von Martens, who figured the species in "Die Preussische Expedition nach Ost-Asien," Zoologischer Theil, ii. (1867), t. 14, f. 9, and this figure has been copied by Mr. G. W. Tryon in his "Manual of Conchology" (2), iii. (1887), t. 33, ff. 29-31. It was likewise figured by Dr. von Möllendorff in the "Jahrbuch der Deutschen Malakazoologischen Gesellschaft," x. (1883), t. 12, f. 9, and by Dr. W. Kobelt in Martini und Chemnitz' "Conchylien Cabinet," ii. (1894), t. 205, ff. 12-14. The shell is disk-shaped, widely perspectively umbilicated, pale corneous brown, composed of six closely regularly coiled whorls, finely striated above with very minute spiral sculpture scarcely visible under a strong lens; the spire is almost flattened, with the apex a little raised; the last whorl widens toward the aperture and is a little deflexed in front. The armature consists of a strong lunate vertical plate on the parietal wall, strongly deflexed posteriorly, the convex side towards the aperture, with two short horizontal teeth on the anterior side, one above and one below, in a line with the two extremities, the upper being the stronger of the two. The palatal wall bears seven horizontal folds; the first thin, near to and parallel with the suture, the second, third, fourth, and fifth, larger and stronger than the first, almost parallel to each other, equidistant and descending a little obliquely posteriorly; the sixth smaller and parallel with the lower suture. There are in addition, behind the principal folds, two small teeth, one in a line with the fifth fold and more or less connected with it, the other midway between the fifth and sixth folds. The second fold is a little indented posteriorly so that a separate denticle is almost formed. The specimen figured is from Hong Kong, and measures 16 millimetres in diameter. A specimen in Mr. Ponsonby's collection is larger, measuring 22 millimetres in diameter; the shell is darker, thicker, rugosely striated, and the spiral sculpture is more decided; the whorls are more tumid and the peristome is much more reflexed and thickened, while the margins are connected by a whitish callus which bears a slight denticle. This specimen probably belongs to *P. pulvinaris* var. *continentalis*, described by Dr. von Möllendorff (Jahrb. Deutsch. Malak. Gesells. xii. (1885), p. 388), from Canton. The shell figured by Dr. Kobelt (op. cit.) bears a similar denticle on the parietal wall. Mr. H. Fulton has obligingly sent me for examination, ten specimens of this species, the smallest of which measures 16 millimetres, and the largest 20 millimetres in diameter; of these, five, including the smallest and the largest, possess the denticle on the parietal callus, and two more have a rudimentary denticle.

*Plectopylis cutisculpta* (figs. 26*a-c*), from Fud-Shien, was described by Dr. von Möllendorff, in the "Jahrbuch der Deutschen Malakazoologischen Gesellschaft," ix. (1882), p. 184, and figured by him in the same work, x. (1883), t. 12, f. 12. The shell is disk-shaped, with the spire a little raised and composed of six or seven slowly increasing whorls, finely ribbed above, smooth and shining below; the last whorl scarcely descends in front, the umbilicus is wide and open, and the peristome is a little reflected, the specimen figured measures 7 millimetres in diameter. The parietal armature consists of a strong vertical plate, a little convex towards the aperture, with a slight angular callosity anteriorly at the lower extremity, and with a little ridge above and below posteriorly; on the posterior

side are, besides, two minute folds, one horizontal near the upper extremity, the other vertical near the lower extremity, the latter being the larger of

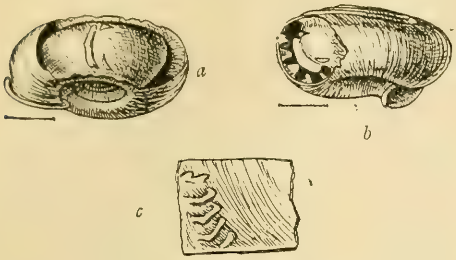



Fig. 26.—*Plectopylis cutisculpta.*

the two (figs. 26*a* and *b*). The palatal armature consists of six folds more or less horizontal, the first short and thin, near the suture, the second a little larger, bilobed; the third, fourth, and fifth longer, broader, obliquely descending posteriorly, and each giving off a minute denticle; the sixth very short as seen in fig. 26*c*. (The first fold has accidently been omitted in this figure.) The specimen is in Mr. Ponsonby's collection.

*Plectopylis multispira* (figs. 27*a–d*), from the Province of Hou-Nan, was described by Dr. von Möllendorff in the "Nachrichtsblatt der Deutschen Malakazoologischen Gesellschaft," xv. (1883), p. 101, and figured by him in the "Jahrbuch Deutsch. Malak. Gesells. x. (1883), t. 12, f. 10, The shell is thin, subpellucid, yellowish corneous, shining above and below, widely umbilicated, composed of seven closely and regularly coiled whorls, gradually and slowly increasing, finely striated, the last whorl being wider and shortly deflected in front. It measures from 8 to 11 millimetres in diameter. The parietal armature is composed

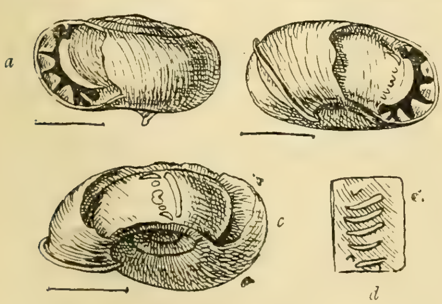



Fig. 27.—*Plectopylis multispira.*

of a strong lunate plate which descends obliquely posteriorly, the convex side being towards the aperture (fig. 27*a*); on the anterior side are found: first, a short horizontal fold in a line with the upper extremity of the vertical plate; below this, almost in a line, are five minute denticles, the second and third of which are united so as to form a double one, while the fifth is a little elongated and slants obliquely downwards (see figs. 27*b* and *c*). The palatal armature (figs. 27*a*, *b*, and *d*) is composed of six more or less horizontal folds: the first very short and thin, near the suture; the second, third, fourth, and fifth stronger and broader, equidistant and parallel, obliquely slanting downwards, and slightly indented posteriorly; the sixth a little narrower, near the lower suture; between the fifth and sixth folds, a little beyond their posterior extremities, is found a little elongated denticle. Fig. 27*a* shows the whole armature from the posterior side, fig. 27*b* from the anterior side, while fig. 27*d* shows the inner side of the outer wall with its folds. The specimen figured is in my collection, and measures 10 millimetres in diameter.

*Plectopylis invia* (figs. 28*a* and *b*) was described and figured by the Rev. P. Heude, in Part 2 of his "Notes sur les Mollusques Terrestres de la Vallée du Fleuve Bleu," published in the "Memoires concernant l'Histoire Naturelle de l'Empire Chinois" (1885), p. 111, t. 30, f. 4, from specimens collected


Fig. 28.—*Plectopylis invia.*

in Tchen-Keou. The shell somewhat resembles *P. multispira* in outline and texture, but it is more strongly ribbed and less transparent; it is composed of only six whorls and it measures only 8 millimetres in diameter; the umbilicus is very deep. The parietal callus forms a raised ridge, not continuous with the margins of the peristome, and giving off a little above the middle a short entering fold. The parietal armature (see fig. 28*a*) further consists of a slightly curved vertical plate, giving off anteriorly at the upper extremity a very slight horizontal support. The specimen here figured has, in addition, a second smaller vertical fold posteriorly to the principal one, but whether this is a normal condition I am unable to say, having only a single specimen to examine. The principal vertical plate has also posteriorly a slight support at the lower extremity. The palatal armature consists of five folds, the first, facing the upper extremity of the parietal fold, thin and longer than the others, attenuated anteriorly and nearly horizontal; the second, third, and fourth are short and broad, very oblique, almost vertical, and connected by a slight attenuated callous ridge, which is continued below the fourth fold; the fifth is thin, horizontal, and situate near the lower suture (see fig. 28*b*). The specimen which I have been allowed to open is in Mr. Ponsonby's collection; it measures 6·5 millimetres in diameter.

(*To be continued.*)

# THE RISE OF PALÆONTOLOGY.

By Arthur J. Maslen.

(Continued from page 144.)

TO Linnæus, the great Swedish naturalist, the study of fossils owes but little. We have already pointed out that his ideas respecting the origin of fossils were in no way in advance of his times. His great work as a botanist we all know; his importance in this history, and indeed to Biology in general, lies in the fact that it is to him we owe the modern method of naming organisms by the use of two words, generic and specific. Previous to this the naming of organisms had been subject to no fixed and universally recognised rules, and a cumbersome system of long descriptive names had grown up. With the introduction of the binomial system of nomenclature by Linnæus an orderly system of naming has been instituted, and so important is this method regarded by modern naturalists that no pre-Linnean names are admitted or can be quoted as evidence of priority. As a consequence of this rule, a large amount of literature written before that time, useful as it may be in itself, is regarded as of antiquarian interest only, while a still larger amount of work between 1766 and 1820 has to share the same fate because the authors did not adopt the binomial system. Indeed, the whole subject of nomenclature and priority has become a very thorny one, and perhaps no subject at the present time gives rise to more animated discussion or ingenious argument than one on the rules of nomenclature. When a man has become accustomed to certain well-known names of organisms which he has used unquestioned for years, he not unnaturally magnifies the evil of changing these names for others known to nobody, excepting perhaps the individual who, hunting in some old and perhaps forgotten book, discovers some older names and henceforth trots out the principle of priority as a court from which there can be no appeal. So we see the necessity for adopting some fixed date beyond which rules of priority do not extend, and the date of publication of the "Systema Naturæ" of Linnæus has been universally accepted. Here again a difficulty arises. A committee of the British Association long ago adopted a set of rules known as the Stricklandian Code, in which the twelfth edition of "Systema Naturæ," published in 1766, is taken as the starting point, while the seventh of the rules drawn up by the German Zoological Society adopts the tenth edition (1758), and they point out that this edition contains all that is really essential. However this may be, the introduction of the binomial system of nomenclature distinctly limits what we may call modern Biology, although at the present time it seems more and more in danger of becoming trinomial or even quadrinomial, owing to the continual splitting up of old genera, and the formation of ever-increasing varieties in species. In this way the good old genus *Ammonites* is divided by Zittel [1] into more than a hundred new genera, the old generic name being retained and put in parenthesis, thus: *Cosmoceras (Ammonites) jason*.

The immense collection of type specimens formed by Linnæus, so important in fixing the exact limits of a genus or species, was bought and brought over to this country by Sir J. Smith, not, however, without the hostility—justifiable, one would think—of the Swedish Government, who sent a warship in chase! However, the specimens were not captured, the Linnean Society was formed, and the original type specimens found a safe resting-place.

Among the valuable works of pre-Linnean date, and which, of course, really belong to the previous period, we may mention that by Plot on the "Natural History of Oxfordshire" (1677) and that on Northamptonshire, by Morton (1705), both important works describing many fossils, while later (1752) "Da Costa published proposals for printing, by subscription, 'A Natural History of Fossils,' but the assistance was far from supporting the expense."[2] The work was issued, however, in 1757. The first book on British geology which can be quoted is one on "Hampshire Fossils," by Gustavus Brander, F.R.S., in which is described and figured the fossils of the very fossiliferous Barton clay. The description of species in this work, which was published in 1766, was given by Dr. Solander, an officer at the British Museum, who fortunately knew of the work of Linnæus, and they were thus enabled to adopt Linnean names.

We now come to two names which stand preeminent among the founders of modern palæontology—Cuvier and Lamarck, the founders of vertebrate and invertebrate palæontology respectively. George Cuvier, born at Montbeliard, near Besançon, in 1769, and educated at Stuttgart, early showed unmistakable signs of his natural history tastes. He was introduced to the leaders of light and learning in Paris by the Abbé Tessier, where, working with two of his great contemporaries, Geoffrey St. Hilaire and Chevalier de Lamarck, his masterly exposition of the great facts of comparative anatomy soon gained him many friends. During this time he was issuing many separate anatomical papers and memoirs, and was gradually laying that

(1) "Grundzüge der Palæontologie."

(2) H. B. Woodward, "Proc. Geol. Assoc.," vol. xiii., p. 268.

solid foundation of comparative anatomical knowledge which was afterwards to be of so much use to him in his studies among the fossil vertebrates. For are not these studies essentially the comparative anatomy of animals, which differ from those with which the anatomist (or osteologist) ordinarily deals, in that, as Huxley has put it, they have been dead longer?

Excavations in the famous Montmatre beds of the Paris basin, so long quarried for the sake of the gypsum used in the manufacture of plaster-of-Paris, had furnished a large number of mammalian bones, while others were obtained from the well-known limestone, the *calcaire grossier*, which in its highest part supplies much of the excellent building-stone of Paris. After working assiduously at these remains for some time Cuvier published his first great work, "Recherches sur les Ossements Fossiles," the first edition of which appeared in 1812. This work, completed in 1822, is the record of the first adequate investigation of the fossil remains of any large group of vertebrates; work to be so ably followed up in this country by Richard Owen (a pupil of Cuvier's, and second only in this field), by Agassiz in Switzerland, and by Hermann von Meyer in Germany.

We all know something of the methods adopted by Cuvier, how his knowledge of comparative anatomy and osteology enabled him to build up his forms from a few scattered bones, taking as his guide the great principle of "correlation of growth." This he was able to do simply because he knew that, at least so far as living organisms are concerned, a certain type of bone or tooth is always found in association with other correlated structures. Was not this, however, exactly the method adopted by Nicholas Steno, the Florentine professor, whose work we have already noticed? How was it that he was able to say that the famous glossopetræ were sharks' teeth? Does he not reason that since glossopetræ are similar to modern sharks' teeth they must have belonged to shark-like animals, with their other correlated peculiarities of structure? Does he not, in reality, build up the fish from its tooth? Most assuredly he adopts the method with which Cuvier is generally credited as the founder. The late Professor Huxley says in his admirable essay on "The Progress of Palæontology," "If you will turn to the 'Recherches sur les Ossements Fossiles' and watch Cuvier, not speculating, but working, you will find that his method is neither more nor less than that of Steno. If he was able to make his famous prophecy from the jaw which lay upon the surface of a block of stone to the pelvis of the same animal which lay hidden in it, it was not because either he or anyone else knew, or knows, why a certain form of jaw is, as a rule, constantly accompanied by the presence of marsupial bones, but simply because experience has shown that these two structures are co-ordinated." (3) However this may be, Cuvier's work was of the very greatest importance; not only did he bring to light a great number of new and extinct mammals, but some of the Montmatre fossils are of extreme interest as affording some of the best examples of what are now called "synthetic types." As an example we may take the two genera of extinct hoofed animals named *Anaplotherium* and *Palæotherium*, the former of which unites in one organism characters some of which are now found only in the pigs, while others are peculiar to the ruminants; while *Palæotherium* unites the characters now found in such apparently diverse animals as the tapir, the horse and the rhinoceros. The later progress of palæontology has resulted in the recognition of a large number of such "synthetic types."

Cuvier soon found followers, both in this country and abroad, and in the front rank must be placed Jean Louis Rodolphe Agassiz and Richard Owen. Agassiz was born at Motier, in Switzerland, in 1807, and after passing through the universities of Heidelberg and Munich, and taking several degrees, attended Cuvier's lectures in Paris in 1831, and rapidly imbibed not only the enthusiasm, but also the teleological and anti-evolutionary opinions of his master. Indeed, the keynote of the entire period we are now considering, the atmosphere of thought which distinguishes it from the present one, is the belief that there were breaks in the history of creation, breaks brought about by catastrophes, during which the whole of the animals and plants perished, to be replaced later by an entirely new creation. Agassiz stands out as the greatest ichthyologist of the century, and his chief work, "Recherches sur les Poissons Fossiles," is a monument of patient labour, consisting as it does of five volumes, with 311 plates, describing 20,000 specimens of fossil fish belonging to 1,700 species contained in all the chief museums in Europe.

The late Sir Richard Owen, a man second only to Cuvier in the field of comparative anatomy, was born in Lancaster ninety-one years ago, and became a student at Edinburgh, and after receiving a medical education in London, was, in 1836, appointed Professor of Anatomy and Physiology at the College of Surgeons. In 1856 he became chief of the Natural History Department of the British Museum, where the palæontological galleries form a lasting monument to his memory. Owen became Cuvier's direct successor, and as Mr. Smith Woodward reminds us, "extending and elaborating comparative anatomy as understood by Cuvier, Owen concentrated his efforts on utilising the results for the interpretation of the fossil remains—even isolated bones and teeth—of extinct animals. He

(3) "Collected Essays," vol. iv., p. 33.

never hesitated to deal with the most fragmentary evidence, having complete faith in the principles established by Cuvier; and it is particularly interesting in the light of present knowledge to study the long series of successes and failures that characterise his work." (4) In truth, he carried Cuvier's principles too far in some respects, for, although his methods are fairly safe when dealing with animals closely related to others now living, they are altogether unsafe when dealing with more remote types. Owen's work among the fossil vertebrates has been exceedingly varied, and nearly all the groups have come under his care, not the least important being his work on that remarkable bird, the *Archæopteryx*, of the Bavarian lithographic stone, while the fragmentary thigh-bone of *Dinornis*, brought to him in 1839, enabled him to demonstrate that gigantic flightless birds had once existed in New Zealand. His work among the invertebrates was perhaps of nearly equal value, especially his researches among the Cephalopoda and Brachiopoda. Anti-evolutionist as were his opinions, he writes in 1866: "The progress of palæontology since 1830 has brought to light many missing links unknown to the founder of the science. My own share in the labour led me, after a few years of research, to discern what I believed, and still hold to be, a tendency to a more generalised or less specialised organization as species recede in date of existence from the present time." (5) In fact, although he distinctly saw evidence for evolution among the many types that he studied, his statements were always tentative and guarded on those great questions of progressive development and evolution, which were to become the guiding principle of the generation of naturalists that followed him.

*(To be continued.)*

## PHŒNOLOGY IN IRELAND.

By John H. Barbour.

THE following notes made during this year, though brief and scattered, may, while swelling the already voluminous material from which those who are working up a special branch of natural science, contain some fact useful in proving an argument or theory. Most of these cases were observed in my own district or county, having been seen either by myself or by someone known by me. In second week of January, primroses were picked on Carnalea golf links, and I myself found them near Bangor. In fourth week of January, a blackbird's nest with four eggs was seen. February 2nd, *Veronica chamaedrys* and *Tussilaga farfara* seen in flower; *Arum maculatum* in full leaf. February 13th, piccotees in flower; flowering currant with leaves partially out; also *Cratægus* in leaf. February 22nd, *Ranunculus ficaria* in flower; *Viola tricolor* (var. *arvensis*) in flower, and it was stated to have been seen in flower even a fortnight earlier. February 27th, *Digitalis purpurea*, leaves fully expanded, near Belfast. March 1st, Frog's spawn seen. March 16th, *Acer pseudoplatanus*, *Fagus sylvaticus*, and *Ribies* in full bud; *Sambucus nigra* in leaf; also *Vicia*; *Corylus* and *Salix* in flower. March 27th, *Petasites major* in flower. March 29th, *Fragaria vesca* in flower. Modifications of *Primula vulgaris* were seen throughout the year: a few with four petals, one with ten petals, five large and five small intervening, one with six petals. *P. vulgaris* with many similarities to a *P. elatior*, but certainly not that form, I thought it might have been *P. variabilis*, but I am not quite sure. A fasciated currant, and a trilobed *Reseda* leaf seen. In August, a mushroom, twenty-three and a half inches round, one pound in weight, was brought into Cloughjordan (Tipperary) post-office. It was quite perfect and was eaten. July 29th, blackberries ripe. At the end of July or beginning of August, I saw the first autumnal tints on some oaks, sycamores, and other trees.

*Bangor, Co. Down; November 8th, 1896.*

Interesting Leeches.—About the beginning of June, this year, while fishing for objects for the microscope in a pond in this neighbourhood, I obtained several specimens of leeches mentioned in Science-Gossip, New Series, vol. ii., pp. 306 and vol. iii., pp. 20. A specimen sent to my friend Mr. Thos. Scott, F.L.S., Leith, was by him sent for verification to Prof. MacIntosh, St. Andrews, who identifies it as *Glossiphonia bioculata* (Bergman), also known as *Clepsine bioculata* (Savigny) and *Hirudo stagnalis* (Linné). There are quite a number of species of *Glossiphonia*: *G. tesselata* (O. F. Müller) which also carries the young in the same manner, is a beautiful green, and the aspect is very striking. Among other species are *G.* or *C. complanata* (Savigny), *Hyalina* and *Sexoculata* (Bergman), and *Marginata* (O. F. Müller), for a lately-discovered member see Science-Gossip, New Series, vol. i., p. 191. In Claus-Sedgewick's Zoology, I read, "The young of *Clepsine* are hatched at a very early stage, and differ essentially from the sexual animal both as regards the shape of the body and the internal organisation. They have a simple intestine, are without the posterior sucker and live a long time attached to the ventral surface of the mother; and it is not until they have received a considerable quantity of newly secreted albuminous matter that they obtain an organisation which fits them to lead a free life." I have not the opportunity, neither as regards time to study it, nor books of reference, to give an account of the creature. Perhaps some correspondent will give a proper life-history of the animal.—*Duncan Adamson, 5, Bridge Street, Motherwell.*

(4) Sir Richard Owen's "Researches on the Vertebrata," "Nat. Science," vol. ii., p. 130.

(5) "Agnes Crane," "Nat. Science," vol. ii., p. 30.

# CHARACTERISTIC BRANCHING OF BRITISH FOREST-TREES.

By the Rev. W. H. Purchas.

(*Continued from page* 151.)

The Oak (*Quercus robur*, Linn.).

IT has been thought by some botanists as well as by foresters that we have in Britain two distinct species of oak, *i.e.* the common or peduncled oak (*Quercus pedunculata*, of Ehrhart), and the sessile-fruited oak (*Q. sessiliflora*, of Salisbury), to which others have been inclined to add, as a third species, or at least as a variety of *Q. sessiliflora*, the *Q. intermedia* of Don. The botanical distinctions between these are found in the comparative length of the fruit-stalk or peduncle, which varies from almost nothing in some examples of *Q. sessiliflora* to a length of two, or even three, inches and more in *Q. pedunculata*, and also in the outline of the leaves, to which may be added a difference in the form of the winter buds and in the texture of their scales.

*Quercus pedunculata.*

*Quercus pedunculata.* (Early summer state.)

In the case of the individuals which show these differences at their maximum, it is not difficult to decide to which of the supposed species each individual should be referred; but the inconstancy of the characters and the existence of intermediate forms have led most modern observers to conclude that the British oaks constitute but a single species. In the majority of cases, however, a difference in the mode of branching, which shall presently be described, comes in to aid in the discrimination, and is often sufficient to enable us to recognise the sessile-fruited oak even in winter. Selby well remarks of this tree that, "The growth of the spray or branching is freer and less tortuous than in *Q. pedunculata*, that the leaf-buds are larger, and the bark in general much whiter in colour; the leaves also, when expanded, are usually larger, and from the length of their petioles hang more loosely and present a less tufted appearance than they do in *Q. pedunculata*." (Selby, p. 248.)

Arrangement of Leaves.—The leaves, and the branches which arise from their axillary buds, are arranged much more uniformly around the stem than in the elm and beech, for in the oak the cycle consists of five leaves, every sixth leaf beginning a fresh series. It is found, however, that a line drawn from leaf to leaf will pass twice round the stem or shoot before the sixth leaf is reached. The diver-

gence or angular distance of each leaf from the next will therefore be two-fifths of the circumference of the stem. This same arrangement, which is expressed by the fraction two-fifths, is found in the apple, the cherry, and various plants.

Position of Flowers.—The oak, like the beech, is monœcious, the staminate and pistillate organs being in separate flowers although borne on the same tree. The inflorescence is lateral—never, I believe, terminal—and therefere never interrupting the growth of the leading shoot. The staminate flowers are arranged in loose catkins which spring in tufts, without any leafy accompaniment, from axillary buds on the lower portion of the previous year's woody shoot. The axillary buds on the upper portion of the same shoot give rise to new shoots, from the axils of whose leaves (commonly about the seventh leaf and onwards towards the tip) the fertile inflorescence takes its rise. The fertile flowers, and the acorns which succeed them, are borne on a stalk or peduncle of varying length, and near the tip of which we sometimes find a leaf-bud formed. The varying length of this peduncle has already been mentioned. In the oak we do not find, as in the lime, a leaf-bud formed in the same axil as that from which the fruit-stalk springs, but the fruit-stalk, when falling off, leaves a scar closely joined with, and on the inner side of, that left by the leaf in whose axil it originated. It may, perhaps, be that the abnormal formation of a small leaf-bud near the tip of a peduncle, as just now mentioned, indicates that the peduncle itself would not fall off with the acorns, but would remain and develop a weakly shoot in the following year. I have not been able to make certain as to this.

*Quercus sessiliflora.* (Autumnal state.)

In the oak we find the peculiarity that the staminate flowers spring from the wood of the past year, the fertile ones from the shoot of the present season. If, then, we examine, towards the close of summer, the shoots of the past and present seasons, we find the lower part of last year's wood bare of leaves, and showing only the scars from whence the leaves and staminate catkins have fallen, whilst the upper portion of the same (last year's) shoot

has given rise to other shoots bearing leaves and acorns, and though still green, yet soon in their turn to become woody.

Length of Internode.—In the more vigorous, quick-growing examples of the oak, the internodes of the yearly shoot are often of the length of two or more inches. This applies to the middle portion of the shoot, for the very lowest and earliest formed internodes are scarcely at all developed, whilst those nearer the tip and which have been formed late in the season are shorter and shorter, so that the last-formed leaves, and the buds in their axils, are grouped as a rosette or crown at the top of the shoot.

Comparative vigour of buds.—The terminal bud is, so long as the tree is in the height of vigorous youthful growth, usually larger, more prominent, and with more force of development than the others which surround it. Hence the shoot which springs from it takes the lead, so that each season's growth is continuous with that of the preceding, whilst the leader is surrounded by three or four smaller branchlets starting in umbellate fashion from the internodes just below its own point of origin. All of these, both leader and lateral shoots, may bear flowers and, in due season, acorns.

The same things occur to these branches in their turn; each of them, both terminal and lateral, comes to an end in a rosette of leaves (through the shortening of the internodes as the season advances), the buds formed in the axils of these leaves forming a crown at the tip of the shoot, and the main axis preserving the same direction from year to year, so that we may sometimes trace it from the main trunk almost to the last year's shoot.

This mode of growth is what we commonly find in the sessile-fruited oak, but it is by no means confined thereto, for it occurs, although less generally, in the pedunculate oak.

*Quercus pedunculata*, Ehrt. (Flowering state.)

In this latter, and more particularly as the tree grows older, or becomes less vigorous, we find another mode of growth. The lateral buds of the crown or rosette are frequently stronger and more vigorous than the central one. When this is the case one or more of these lateral (axillary) buds will develop into shoots, whilst the central (terminal) bud remains dormant. The direction taken by these shoots makes a wide angle—almost a right angle—with that of their parent shoot, and thus is laid the foundation of that zigzag or elbowed branching which we regard

as most characteristic of an oak at maturity or in its decline.

Tendency to flower.—As the tree increases in age the tendency to a robust leafy growth gives way to a disposition to bear flowers and fruit, and so to provide for the reproduction of the species. The shoots formed are less stiff and thick than in earlier years, and consist of shorter internodes. The greater number of their leaves form axillary buds, which, in the next season, will put forth staminate catkins; the only leaf-buds formed by such shoots are those in the axils of the terminal rosette of leaves. When the staminate catkins, after fulfilling their office, have withered and fallen, the branchlet is left bare for the greater part of its length, and thus originates that tufted interrupted character of foliage which is commonly associated with the elbowed branching of a veteran oak.

Angle.—The angle which the branches make with the stem, and the spray with the branchlets, is variable. The lower main branches often spread almost horizontally from the trunk; those above them take a more upward direction. In the case of the younger growths, such of the sprays as originate towards the middle of the previous year's shoot make an angle with it of less than half a right angle. Those which spring from near the tip make, as has already been said, nearly a right angle, and become the foundation of a tortuous gnarled growth as they eventually become branches.

Diameter of yearly shoot.—This is not great, being about one-eighth of an inch; a greater thickness, indeed, than in the beech, but considerably less than in the ash or horse-chestnut. The rigidity of the spray of the oak seldom allows of any drooping tendency.

In examples where the terminal bud of the leading shoot has, season after season, been vigorous, the original direction of the branch will, as already observed, be followed for a long distance. All varieties seem eventually, however, in their ultimate branching, to take a zigzag direction, owing, as already explained, to the greater vigour of the lateral over the terminal buds. This tendency shows itself much earlier in the life of some trees than of others, and more notably in the pedunculate than in the sessile-flowered oak.

The oak, from its noble stature and the sturdy, vigorous growth of its branches, has always been regarded as the king of forest trees. In its main outline and general features it shows considerable variation. Some individuals are lofty, others spreading in outline. In the one case the height greatly exceeds the diametric spread of the branches; in the other the extent of the branches measures much more than the height of the tree.

Gilpin happily remarks (p. 48): "The limbs of most trees spring from the trunk. In the oak they may rather be said to *divide* from it; for they, generally carry with them a great share of the substance of the stem. You often scarcely know which is stem and which is branch; and towards the top the stem is entirely lost in the branches."

Again (p. 140): "The oak divides his boughs from the stem more horizontally than most other deciduous trees. The spray makes exactly in miniature the same appearance. It breaks out in right angles, or in angles that are nearly so, forming its shoots commonly in short lines, the second year's shoot usually taking some direction contrary to that of the first. Thus the rudiments are laid of that abrupt mode of ramification for which the oak is remarkable."

Selby's (p. 284) words are well worth quoting as they illustrate and carry out what has been said: "The horizontal direction of the branches, their strong tortuous and sinewy aspect, the angular interwoven nature of the spray, are all suited to the pencil, and give to the oak, even in its denuded state, a richness of appearance possessed by no other tree. Its foliage, also, is such as a painter likes to delineate, being richly tufted and clustered together, forming those masses which produce the finest effect of light and shade, and its colour is warm, rich and pleasing, from the period that the leaves first burst their cerements to the rich russet tints they acquire previously to their fall in autumn. The tufting of the foliage, we may remark, is much more conspicuous in the peduncled oak than in the sessile-fruited variety, and on this account the former surpasses its rival in picturesque effect, for, as the Rev. W. T. Bree observes, 'the leaves of the *Q. pedunculata*, though rather small, are very numerous and grow close to the spray, clustered in those dense masses which constitute one of the characteristic beauties of the oak.' Whereas those of *Q. sessiliflora*, though larger in size, are less thickly set, and from the length of the petioles, hang loose and straggling, and give to the general aspect of the foliage that want of depth and solidity possessed by the other."

SIR BENJAMIN WARD RICHARDSON, the eminent physician, died of apoplexy, early on Saturday morning, November 21st, after a very short illness. He was a zealous advocate of teetotalism, and one of the first medical men to recommend cycling as conducive to health. In 1865 Dr. Richardson devoted much time to research into the nature of the poisons spreading contagious diseases which resulted in the discovery of a special product common to all these poisons, to which he gave the name of septine. He also spent much time in searching for an anæsthetic which would abolish pain in surgical operations. He was one of the first to use methylene bichloride for this purpose. Dr. Richardson was the editor of the *Asclepiad*, a quarterly journal which has occasionally been referred to in the pages of SCIENCE-GOSSIP. He was also the author of numerous works of medical and general interest.

# STRUCTURAL FEATURES IN ROTIFERA.

By Chas. F. Rousselet, F.R.M.S.

IN reply to Dr. Stokes' recent notes on American Rotifers, I hasten to inform him and other readers of Science-Gossip abroad, that the curious organ seen by him at the entrance of the œsophagus into the stomach of *Brachionus bakeri* and other rotifers, is also invariably present in the European forms, and I cannot say why it is not mentioned in Hudson and Gosse. In some species the œsophagus seems to be prolonged as a little tube within the stomach, an excellent arrangement to prevent the return of the food particles, but the movement of the tube is due entirely, I consider, to the action of the flagelliform cilia, with which the inner wall of the œsophagus is lined. These cilia are often very long, and I have seen them individually in the œsophagus of *Asplanchna priodonta* and *A. brightwellii*. Again, with regard to the dorsal and lateral antennæ, they are almost universally present (in the *Philodinaea* only the lateral antennæ appear to be absent), but sometimes very difficult to see. In *Pterodina* the single dorsal antenna is always, the two lateral antennae often, very small, but can always be found with a sufficiently good glass, the latter high up near the edge of the lorica nearly on a level with the jaws. Mr. Gosse seems to have seen the antennæ only in a few of the larger species, and the reason for this is obvious when the circumstances are considered. Most of Mr. Gosse's work on rotifers was done in the fifties and early sixties, when object-glasses were much inferior to what they are now, and later, in the eighties, when Mr. Gosse resumed his work, he was past seventy years of age, and he may well be excused if his eyesight was no longer as good as in younger days. Further evidence on this subject is furnished by the following passage in his son's book, "The Life of P. H. Gosse," page 254: "Another and more permanent friendship formed at Tenby (in 1854), was that with Mr. Frederick Dyster, the zoologist, from whom he bought, for £30, the microscope which he continued, regardless of modern improvements, to use until near the end of his life."

This old microscope is still in the possession of his widow, and explains a good deal; no one could better describe and delineate what he saw than Mr. Gosse, but naturally, his powers of seeing minute details were limited by the quality of his microscope, and the great wonder only is that he has seen so much.

The modern apochromatic lenses are so vastly superior to the optical means at our disposal twenty years ago, that we must not wonder at often finding minute structures in rotifers, which our predecessors in the study could not see, or could only imperfectly see under exceptionally favourable circumstances. Thus, Mr. Gosse figures the tubules at the sides of the body of *Copeus pachyurus*, and says of them: "I can discern, even with a high power, no setae at the tips of these tubules." And yet they are there, and readily seen with a modern apochromatic $\frac{1}{6}$-inch. In many other rotifers I have found the lateral antennæ, although Mr. Gosse positively states that there are none, because he could not find any.

I would earnestly advise students of rotifers not to make new species, because of such minute anatomical details, otherwise endless confusion will follow. The descriptions and figures of the rotifers we have are by no means quite accurate or complete, and there is a great deal to be done in checking and correcting the older observations, and besides, a good deal of variation must be allowed in the size and shape of some species.

About 286 new species of rotifers have now been named and described since 1889, when the Supplement to Hudson and Gosse's Book was published. A considerable number of these will have to be struck off the list as being synonyms, or species insufficiently figured and described.

Dr. Stokes' new *Salpina similis*, described in the "Annals and Magazine of Natural History" for July last, is, it seems to me, identical with Gosse's *S. macracantha*. His *Notommata mirabilis* is nothing but our *N. tripus*; the two frontal and two lateral antennæ can be seen here as well as in America, and the size and position of the tail varies somewhat. Further, it is certain, that even Gosse's *N. tripus* and *N. pilarius* are one and the same animal; the views of both figures can be obtained perfectly by focussing higher and lower on the same animal. The new *Rattulus palpitatus* is most probably identical with *Coelopus brachiurus*. I am convinced Mr. Gosse made a great mistake in founding the genus *Coelopus*, and describing the toes as one within the other. His figures are fairly correct, but his interpretation I consider wrong. All the animals of this genus have two narrow, curved, nearly equal toes, separated at the base, but joined at the tip, thus leaving a clear space between and moving together. This clear space Mr. Gosse took for a toe lying in the hollow of the other toe. By crushing a number of these animals the falacy is quicky dispelled.

I hope I have said enough to warn students of rotifers against making new species simply because they find some structure which is not mentioned in the original description.

*27, Great Castle Street, London, W*

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Round the Year: A Series of Short Nature-Studies.* By Professor L. C. Miall, F.R.S. 295 pp. 8vo, and 72 illustrations. (London and New York: Macmillan and Co., Limited, 1896.) Price 5s.

The satisfaction of taking up any work by Professor Miall lies in the feeling that whatever therein may be contained will be not only popularly written, but also with accuracy. So much book-making nowadays exists that it is really difficult for the uninitiated to select the grain from the chaff, among the "embarrassment of riches" displayed on the counter in a good book-shop, for readers with a taste for science. Still there is safety in names of authors, and among them we may count the writer of "Round the Year." In this book we find the most commonplace subjects treated as an entertaining story. These subjects


Claws of Nightjar and Heron.
(From Professor Miall's "*Round the Year.*")

are selected with a seasonableness which is attractive, and show how easy it is to find food for speculative thought, even in the cold and desolation of wet or snowy wintry days. Take, for instance, the thoughts expressed in the chapter on "Animals with and without combs," from which we reproduce a couple of illustrations, one being the claw of a nightjar, magnified, and the other a claw of a heron, also magnified. Professor Miall says, "I sit by the fire and lazily watch Theta cleaning and smoothing her fur. She not only washes, but combs her fur with her tongue. We have all allowed some pet cat to lick our hands, and know very well that she has a rough tongue. Cuvier tells us that the lion's tongue is so rough that it can be used to rasp the flesh from bones, and it has been said that the cat's tongue is used in the same way. In the case of the lion, the horny, recurved claw-like papillæ are nearly a quarter of an inch long, but I doubt whether the cat's tongue is an efficient rasp. What, then, is the use of the horny papillæ which the cat too possesses? I think they are chiefly serviceable as a comb, and that it is because the cat bears fur and not because she devours flesh that she has a prickly tongue. Are then all fur-bearing animals provided with a prickly tongue? By no means." He proceeds to discuss many animals and their various methods of trimming their fur or feathers. There are about forty subjects treated, generally from simple incidents that form texts upon which much valuable information is based, as in the case of Theta and her rough tongue. Some of these titles include "White of Selborne," "Snowflakes," "Buried in the Snow," "Which are the Wettest Months?" "Catkins," "The Botany of a Railway Station," "Duckweed," "Tennyson as a Naturalist," all of which may be read with pleasure and instruction. In this work there is not a dry page, but if one finds less interest in some of the subjects than others, there is ample variety to select from.

*Elementary Geology.* By G. S. Boulger, F.L.S., F.G.S., 180 pp. 8vo, illustrated by 132 figures. (London and Glasgow: William Collins, Sons and Co., Limited.) Price 1s. 6d.

This handy little book forms one of Collins' Elementary Science Series, and is founded on "The First Book of Geology," by the late Dr. W. S. Davies. Professor Boulger has re-written and revised that work, and brought his subjects up to present knowledge. His mode of treating the various items is concise, and after the manner of the modern text-book, which seems to be all that is desired by the class of gentlemen to whom the author dedicates his work. This system of cramming with just enough knowledge of various subjects seems to be a necessity of these times of competitive examinations, but we seriously doubt if it is one which will find favour with generations to to come. The only hope is that the youth of the present time, if not well-nigh nauseated during the process of cramming, may learn sufficient to create a taste for more deliberate study. These remarks are not by any means directed against the book before us, for it is one of the best of its class, and we congratulate Professor Boulger on so far succeeding in the uncongenial task of whittling down the information to such narrow limits, and yet lucidly stating in a few words what should require whole volumes. At the end of the book are printed the questions given in the years 1889–1896, in the Science and Art Department first stage or elementary examinations. These should be useful to many students as examples of what they may expect when their turn comes around.

*The Theory of Perspective.* By C. H. Swinstead. (London: Simpkin, Marshall and Co.) Price 2s.

This is a technical work especially prepared for candidates of the Science and Art Departments. The problems are carefully prepared and explained.

*In the Green Leaf and the Sere.* By "A Son of the Marshes." 288 pp. large 8vo. Edited by J. A. Owen. With illustrations by G. C. Haïté and D. C. Nicholl. (London: Kegan Paul, Trench, Trübner, and Co., Limited, 1896.) Price 7s. 6d.

Another book on country lore is before us. We welcome it with all its faults; for do not these books turn men's minds from the sordid city to the beauties of rural life? Handsomely produced by the publishers, it is a tempting treasure for the naturalist and country lover who has not yet reached the ascetic stage of specialism, To him, and her also, will this book appeal, with its word pictures of common objects. Not always is the style of these pictures what one would write down as elegant, nor, indeed, expressive. For

instance: "The frog, like the common snipe—that in some districts has got very uncommon—likes a nice dry place to 'absquatulate' in and to think matters over; for froggy is by nature very contemplative. The herons know all about this weakness of his, and they glide like shadows to where he sits, with his beautiful eyes staring at nothing in particular, and 'embalm' him." How much more effective would have been this paragraph without the term "absquatulate"; for the word "embalm" there remains so many other words in our language far more expressive. Not that all is of this manner, for occasionally we meet with pages where the word pictures are those to ponder over. Writing of the great shrike, "A Son of the Marshes" says: "Certain flight lines are followed by a certain class of birds, even although the inducement that at one time caused them to follow those lines may have ceased to exist. This is the case with the great shrike, for one was seen in the same place to which I have above referred, in the year 1891. Three, or it may be four, dead ones have been shown me in the course of the last seven years, and all these had been shot in a sort of 'no man's land' district, where old orchards still existed." There is much delightful reading in this book, but it is unnecessarily disfigured in some places by paltry little expressions which could have been so easily spared; for instance, "a certain class of wind-bag ornithologists." The illustrations are spirited, and produced as well as half-tone process work ever succeeds. With the permission of the publishers we give one of them here, representing a hawfinch in an alder tree. The book is one we can quite recommend, though it would have been much improved by a little better taste having been exercised in eliminating a number of commonplace colloquialisms.

A Hawfinch. (From "*In the Green Leaf and the Sere.*")

## SCIENCE ABROAD

CONTRIBUTED BY G. K. GUDE, F.Z.S.

Bollettino dei Musei di Zoologia ed Anatomia Comparata della R. Università di Torino (Turin: xi., 1896). Dr. Guiseppe Paravicini gives the result of his anatomical and histological researches on the common garden-snail *(Helix pomatia)*, in which he deals with the lingual ribbon, radula, and the various muscles in an exhaustive manner. Dr. Achilli Griffini treats of the Italian Acroceridi, a section of Diptera, figuring a new variety of *Oncodes marginatus*, under the name of var. *etruscus*. Dr. Daniele Rosa describes two new species of worms, *i.e. Allolobophora tigrina* and *A. exacystis*, the former from Mehadia and the latter from Siebenburgen. Dr. Achille Griffini discusses the specific value of *Dytiscus disjunctus*, and while inclined to the view that it is more nearly allied to *D. lapponicus* than to any other species, yet it differs more from that species than does *D. circumcinctus* from *D. marginalis*, and he therefore considers *D. disjunctus* sufficiently distinct to warrant its being regarded as a separate species; a figure of a male specimen accompanies the text. Mr. T. Salvadori contributes a catalogue of a collection of birds from the neighbourhood of Deli, Sumatra, 109 species being enumerated, with bibliographical references. Professor L. Camerano treats on a skull of *Cercopithecus ruber*, with anomalous dentition, with four figures in the text. Dr. M. G. Peracca describes two new species of snakes, from South America, *Atractus boulengerii* and *A. iridescens*, with figures of the heads. The same author catalogues the reptiles and Amphibia collected by Dr. Festa in Darien and Panama. He figures the head of *Ptychoglossus festae*, originally described by him in the same work as *Diastemalepis festae*, as the type of a new genus, but further investigation has induced him to include the species in the older genus. He also figures the head of *Scolecosaurus pallidiceps*, described by Cope in 1862. Dr. Filippo Silvestri, in enumerating the Chilopoda and Diplopoda collected by Dr. Festa near La Guayra, in Darien and near Cuenca, describes several new species, illustrated with figures in the text. Dr. Peracca further catalogues the reptiles and Amphibia collected near Buluwayo, by the Rev. Luigi Jalla, a missionary on the Upper Zambesi; one new species of snake, *Psammophis jallae*, is described and illustrated by two figures. Dr. Filippo Silvestri describes and figures five new species of Diplopoda collected by the same missionary. Professor Corrado Parona and Dr. Vincenzo Ariola each contribute an article on Helminthidae of the Zoological Museum of Turin.

L'Echange Revue Linnéenne (Lyons: July–November, 1896). Mr. N. Roux enumerates the plants collected during the annual outing of the Botanic Society of Lyons. Mr. Daveau discusses the littoral flora of Portugal. The flora of that country, he informs us, is beginning to be extremely well known, thanks to active researches, especially during the last fifteen years. The littoral zone, with which the author deals principally, comprises an extent of 793 kilometres, which is increased by the vast estuaries joined by the marshes. The Tagus divides the country into two regions, the northern—mountainous, rainy and colder; the southern—dryer, with plains predominating. The differences, however, are less accentuated over the littoral zone on account of the neighbourhood of the sea. Mr. Mollerat gives the results of dredgings carried out along the coast of Saint-Raphael (Dept. Var), at depths of thirty to seventy metres. Mr. Maurice Pie contributes a long list of habitats of Ptinidae, of North Africa, which does not profess to be exhaustive, since he does not enumerate all the species known to occur in that region, nor does he give all the habitats known for those he enumerates, they are simply cited from the specimens in his collection; a total of fifty-three species and fifteen varieties is given. Mr. Arnould Locard discusses *Helix intersecta* and its allied forms. It appears that *Helix caperata*, described by Montague in 1803, in "Testacea Britannica," is the same shell as *Helix intersecta*, described two years previously by Poiret in "Coquilles fluviatilis et terrestres de l'Aisne," the latter name has, therefore, precedence. Four other forms, closely allied, and forming with the type species a natural group, are described in detail. They are all members of the French fauna, and are, according to Mr. Locard, very little understood, a remark which we can fully endorse; they are, in fact, likely to remain so.

La Feuilles des Jeunes Naturalistes (Paris: October and November, 1896). M. Cossman contributes an extensive and valuable summary of works on Paleoconchology. A new land-shell is recorded for the French fauna by E. Margier, who found *Pupa mortilleti* at Briançon, in the Hautes Alpes. M. Guignon gives an illustration of a monstrosity of *Helix hortensis*, in which the upper left tentacle is bifurcate, each branch bearing an eye and each being independently retractile. Mr. C. Davies Sherborn contributes an exhaustive report on work done and changes carried out in the British Museum. Mr. Gustave Dollfus contributes an instructive article "On the Delimitation of the Species of Animals." In summarising a work by Mr. G. Coutagne, on "Researches on the Polymorphism of the Mollusca of France," he draws special attention to the useless creation of innumerable species by the new French school of conchologists, founded by the late Mr. Bourguignat, and still continued by several of his followers. It is worthy of note that Mr. Coutagne knows perfectly the species (?) created by Mr. Bourguignat, and has studied equally those of Mr. Locard and others of the same school, having had their types in his own hands, and that he has received, under different names, specimens absolutely identical and from the same locality. To give but one instance of the useless multiplication of so-called species, we may mention that under the synonymy of *Helix striata* no less than twenty-seven names are enumerated which have from time to time been raised to specific rank. In expressing the hope that Mr. Coutagne will render the service to science of producing a real catalogue of the terrestrial and fluviatile mollusca, which can with certainty be recognised in France, a hope that will be echoed by every malacologist who has the real interest of his favourite study at heart, we welcome this well-timed protest by two eminent Frenchmen as a sign of reaction against the perversion of science.


CONDUCTED BY FRANK C. DENNETT.

| | Dec. | *Rises.* *h.m.* | *Sets.* *h.m.* | *Position at Noon.* *R.A.* *h.m.* | *Dec.* |
|---|---|---|---|---|---|
| *Sun* | 8 | 7.55 a.m. | 3.49 p.m. | 17.3 | 22° 49′ S. |
| | 18 | 8.5 | 3.50 | 17.48 | 23° 25′ |
| | 28 | 8.9 | 3.56 | 18.32 | 23° 15′ |
| | | *Rises.* | *Souths.* | *Sets.* | |
| *Moon* | 8 | 11.13 a.m. | 3.32 p.m. | 8.2 p.m. | |
| | 18 | 2.3 p.m. | 10.55 | 6.50 a.m. | |
| | 28 | 1.6 a.m. | 6.27 a.m. | 11.33 | |

| | | *Souths.* *h. m.* | *Semi Diameter.* | *Position at Noon.* *R.A.* *h.m.* | *Dec.* |
|---|---|---|---|---|---|
| *Mercury* | 8 | 0.15 p.m. | 2″ 3 | 17.26 | 24° 53′ S. |
| | 18 | 0.46 | 2″ 5 | 18.36 | 25° 22′ |
| | 28 | 1.14 | 2″ 8 | 19.44 | 23° 22′ |
| *Venus* | 8 | 2.38 | 7″ 1 | 19 48 | 23° 14′ S. |
| | 18 | 2.49 | 7″ 5 | 20.39 | 20° 34′ |
| | 28 | 2.58 | 8″ 0 | 21.27 | 16° 58′ |
| *Mars* | 8 | 0.11 a.m. | 8″ 3 | 5.19 | 25° 39′ N. |
| | 18 | 11.9 p.m. | 8″ 1 | 5.2 | 25° 38′ |
| | 28 | 10.17 | 7″ 6 | 4.49 | 25° 28′ |
| *Jupiter* | 18 | 4.59 a.m. | 18″ 2 | 10.48 | 8° 47′ N. |
| *Saturn* | 18 | 9.42 | 7″ 1 | 15.36 | 17° 17′ S. |
| *Uranus* | 18 | 9.48 | — | 15.38 | 19° 12′ S. |
| *Neptune* | 18 | 11.19 p.m. | 1″ 2 | 5.11 | 21° 32′ N. |

MOON'S PHASES.

| | | *h.m.* | | | *h.m.* |
|---|---|---|---|---|---|
| *New* | Dec. 4 | 5.51 p.m. | *1st Qr.* | Dec. 12 | 0.29 a.m. |
| *Full* | „ 20 | 4.5 a.m. | *3rd Qr.* | „ 27 | 0.9 p.m. |

SUN.—Spots may still be expected to be few and small, though there is a slightly increased activity.

MERCURY, from its nearness to the sun in the early part of the month and great southern declination later on, is badly placed for observation.

VENUS is an evening star, setting on December 30th at 7.38 p.m., but is too far south for good observation.

MARS, being in opposition to the sun at 6 a.m. on December 11th, is in its best position for observation, though its small angular diameter is not favourable for the easy study of its details. It is visible all the night.

JUPITER rises at 11.1 p.m. on December 1st, and at 9.15 on 31st, and is in position for observation until sunrise. On the morning of the 13th, at 3.29, the outer satellite, iv., enters upon the disc, passing off at 7.54. On the 20th, at 10.7 p.m., iii., the largest moon, passes on to the disc, and off at 1.38 on the morning of the 21st. They may probably appear as dark spots when they are near the middle part of the transit.

SATURN and URANUS are too close to the sun for observation.

METEORS should be specially looked for on December 8th, 9th, 11th, 12th and 21st.

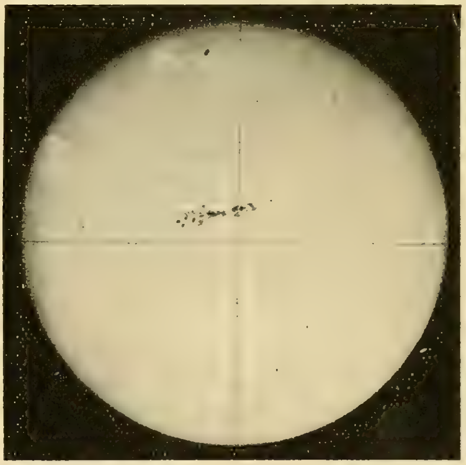
VARIABLE STARS.—During December the following may be looked for:

| | *R.A.* *h.m.* | *Dec.* | *Magnitude.* *Max.* | *Min.* | *Period.* |
|---|---|---|---|---|---|
| ϵ Aurigæ | 4.52 | 43° 37′ N. | 3·5 | 4·5 | |
| R. „ | 5.6 | 53° 26′ N. | 6·6 | 12·7 | 12·7 days. |
| R. Leporis | 4.53 | 15° 0′ S. | 6·0 | 9·0 | 439·0 days. |
| 15, S. Monocerotis | 6.33 | 10° 2′ N. | 4·9 | 5·6 | 3d. 10h. 48 m. |
| α Orionis | 5.48 | 7° 22′ N. | 1·0 | 1·4 | Irregular. |
| δ „ | 5.24 | 0° 24′ S. | 2·2 | 2·7 | |

Minima of the star Algol should occur December 3rd, 11.5 p.m.; 6th, 7.54 p.m.; 26th, 9.36 p.m.; and 29th, 6.25 p.m.

THE STUDY OF THE SUN'S SURFACE.—A good way to make a general examination of the disc is to allow the image projected from the eyepiece to fall on a white card, when it can be examined by a lens, both for dark spots and bright (faculæ), any special details can then be examined directly, the dark cap being screwed on the eyepiece, or, better still, a properly constructed solar eyepiece. For the study of large spots, a tiny pinhole diaphragm in an ordinary astro-eyepiece is most useful, permitting the nuclei to be observed in the umbræ, adding much to the marvellous structure which these spots reveal. Changes take place in these spots very rapidly sometimes. In a large spot visible early in November, such changes took place, involving immense areas, in the interval between 11.30 a.m. and 2.45 p.m. on November 6th.

THE GREAT GROUP OF SUNSPOTS visible in the middle of September, was a truly remarkable object, occupying forty-four hours crossing the central meridian. The area covered by the gigantic disturbance was, in round numbers, 2,400,000,000 square miles. It is remarkable that amongst the spots forming the group there was a constant



recurrence of a double umbra. This will be noticed in the reproduction which we give of the Greenwich photograph taken September 16th, and very kindly forwarded to us by the Astronomer Royal for that purpose. A remarkable object was the little black pilot spot which preceded the main group.

WE are sorry to have to record the sudden death of M. François Félix Tisserand, Director of the Paris Observatory, in his fifty-second year. He received his degree of Doctor of Science in 1868, and entered Paris Observatory as assistant astronomer. In 1871, he was appointed Director of Toulouse Observatory and Professor of Astronomy. The transit of Venus, in 1874, led him to travel with M. Janssen to Japan to observe it, and in the same year he received the red ribbon of the Legion on Honour. Since 1881, he has been a Foreign Associate of the Royal Astronomical Society. After the death of Admiral Mouchez, he was appointed, in August, 1892, Director of the French National Observatory. Since 1886, a great deal of his attention has been given to the production of his great treatise on mathematical astronomy, "Traité de Mécanique Céleste.


LATE SWALLOWS—On Sunday, October 25th, 1896, I saw three swallows and a martin wheeling around the houses of Carew Road, Thornton Heath, near to the recreation ground. This date appears to be worthy of record.—*E. A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

FOSSIL FERN AT GIANT'S CAUSEWAY.—I noticed this year when at the Giant's Causeway, Antrim, a fossil fern, which I have not seen chronicled anywhere before, but which may be of interest. It was the distinct impression of an almost perfect fern-leaf on one of the hexagonal surfaces of one of the columns of that part of the Causeway termed the Honeycomb (I am not quite sure if it was the Honeycomb, but I think it was, and next year I intend to look for it again). I am unable to say what this fern was or how it could get there. Perhaps some of your geological readers might be able to suggest a cause.—*John H. Barbour, Bangor, co. Down; November 8th*, 1896.

NEW FOCUS TUBE.—Messrs. W. Watson and Sons, of 313, High Holborn, London, are introducing a new focus tube on a very much improved principle. The electrodes are widely separated, so that there is no chance of sparking between them outside the tube; also, by a simple device, the whole of the cathodic stream impinges upon the platinum anode, and a special metal is used by means of which hydrogen is stored. When the tube gets high in vacuum, it is only necessary to warm it by a spirit lamp to be at once brought to the desired pitch of exhaustion. These tubes are much more brilliant than any other forms that we have yet seen.

CAMBERWELL BEAUTY IN SCOTLAND.—I see notes in SCIENCE-GOSSIP (pp. 164 and 165) as to the occurrence of *Vanessa antiopa* over Northern Scotland, stating that its occurrence in that quarter is rare. I do not see why it should be confined to the south of our Islands, as I have seen it in Norway and you say that it might have come from Scandinavia. Morris, in his "British Butterflies," says that it has been noticed in Scotland "as far north as Ayrshire," which is only just over the Border. I may mention that I once caught a specimen which had settled on the road opposite the Fifth Avenue Hotel in the heart of New York, and that I have seen it in Switzerland and other parts of Europe.—*S. Arthur Sewall, Ranelagh Road, Ealing, W.*

THE PUBLICATION OF LOCALITIES.—I have read with much interest, Mr. Carrington's account of the discovery of *Calophasia platyptera*, Esp., under circumstances which, in his opinion, seem to establish its claim to inclusion amongst our recognised species; but I venture to think that his action in describing so minutely the situation of the spot where the insect was procured will be greatly deplored by all entomologists worthy the name, or, in other words, by those who are entomologists first and collectors afterwards. At a time when we are beginning to realise that, unless speedy action be taken, many of our rarer species will soon be ours only in name and in the shape of cabinet specimens; also when the Entomological Society is engaged in formulating some scheme for checking the ravages of the indiscriminate collector, whose sole aim appears to be that of record breaking in the acquisition of long series of "good things," it is peculiarly unfortunate to find our esteemed editor aiding the spoilers in their work. I am not now concerned in discussing the question as to whether the history of *Eupithecia extensaria* is or is not likely to be paralleled in the present instance, but I cannot refrain from expressing my conviction that the Brighton locality will be practically worked to death, so far as *platyptera* is concerned, by the close of next season. Some will probably think my view an unnecessarily pessimistic one, but others, who have had practical experience of the persistent and unscrupulous warfare waged against many of our choicest species by so-called entomologists, will no doubt join with me in protesting against the indiscriminate publication of details, putting "all and sundry" on the track of rarities. Whilst there are black sheep in our ranks, and I am afraid we must with sorrow confess that there are many such, it is our duty in the best interests of entomological science to emulate the example set by Mr. G. T. Harris on p. 165 of the November issue of this journal, where I rejoice to note that he safeguards *Thecla pruni* in a Herefordshire locality.—*F. R. Rowley, Corporation Museum, Leicester.*

CORRESPONDENCE WANTED.—As a boy I used to see and read SCIENCE-GOSSIP. Mr. J. Jenner Weir, F.L.S., Mr. McLachlan, Dr. Wallace (Darwin on one occasion), visited my father's house, he being President of the West Kent Microscopical Society. I have travelled over almost every part of Australia as explorer, "overlander" (cattle-driver), miner, artist for the *Illustrated London News*, and in later years as mining correspondent for the *Coolgardie Miner*. I was artist for the Royal Geographical Society of New South Wales on the "Bonito" (New Guinea Expedition, of 1885). Corresponding with Mr. Jenner Weir until his death, I used to send him butterflies, and relate to him what I saw in my travels. I am no scientific expert, but really love collecting and studying insects and animals. Mostly in out-of-the-way places, my opportunities for obtaining little-known species of the fauna and flora of Australasia are unrivalled. It is a pity such an exceptional opportunity is thrown away. Might I trouble you to consider if you could introduce me to a correspondent similar to Mr. Weir?—someone who has a larger mind than the everyday specialist-naturalist. There is much a true lover of nature could learn from me, although I hardly know the Latin name of a single animal. I was the first to draw attention in print to the tree-kangaroo of Queensland, in my novel, "The Black Police." In return for such help, I want to be posted with the latest thoughts of the broad-minded naturalists with whom my correspondent comes in contact. I would like also to have certain questions answered from time to time as to specimens I might send. The opportunity for collecting—especially lepidoptera and other insects, birds, minerals and plants—is great; and it is really a pity that there is no one to whom I can send things, who could make use of them. Can you recommend any person who would care to correspond with me?—*A. J. Vogan, Tauranga, Bay of Plenty, New Zealand.*

## SCIENCE GOSSIP

MESSRS. ARCHIBALD CONSTABLE AND CO., the well-known publishers, of Westminster, have secured the entire copyright in the English language of Dr. Nansen's forthcoming work on his expedition to the North Pole.

ON January 7th next, the Rev. J. W. Horsley will give an address upon "Birds" before the Fulham Society of Literature, Science and Art. The meetings of the society are held monthly in the Council Chamber of the Fulham Town Hall.

ROYAL INSTITUTION.—The annual course of Christmas Lectures, specially adapted for children, this year, at the Royal Institution, will be delivered by Professor Silvanus P. Thompson, F.R.S., his subject being "Visible and Invisible Light." The Managers have elected Dr. Augustus D. Waller, M.A., F.R.S., Fullerian Professor of Physiology for three years, and have appointed Dr. Alexander Scott to be Superintendent of the Davy-Faraday Research Laboratory of the Royal Institution.

A BIBLIOGRAPHY OF GILBERT WHITE.—This work on the Natural Historian and Antiquarian of Selborne, is announced to be published immediately by the Roxburgh Press. The book is by Mr. Edward A. Martin, F.G.S., and is published under the auspices of the Selborne Society, of whose Magazine and Leaflet Committee Mr. Martin is Honorary Secretary. This book runs to nearly 300 pp. octavo, and an *edition de luxe* is also contemplated. Mr. Martin has been furnished with information in compiling the Bibliography by a large number of ladies and gentlemen.

THERE died on October 18th, aged 91 years, William Wilson, farmer, Hillocks, Alford, Aberdeenshire, the last of four remarkable men in that district, of a past generation, who devoted themselves to the natural history surrounding them. The first was A. Murray, M.D., who wrote part of a work called "The Northern Flora." Another, the Rev. J. Farquharson, F.R.S., of Alford. Then the Rev. J. Minto, teacher, Clatt, uncle of the late Professor Minto, who contributed to Professor Dickies' Botanical Guide. The late Mr. Wilson devoted much of his leisure time to acquainting himself with natural history, both as investigator and by studying the literature of the subject. While occupying no prominent sphere in the world of science, he followed closely all attempts of scientific men to show the relationship of the various sciences to husbandry. As a botanist he discovered *Linneæ borealis* growing on an open moor; Alpine sow-thistle at a lower sea-level than previously known to exist. He was the first to notice what has proved to be a remarkable extension in area of the beech fern (*Phegopteris*). He traced many remarkable changes in the distribution of animals as affected by man's agency, such as the departure of some and appearance and change of habits of others Of birds, the snipe has practically disappeared from his district, while the curlew and starling have established themselves during his time.

## TRANSACTIONS

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Tuesday, 6th October, 1896. Exhibits: Mr. J. A. Clark, *Sirex juvencus*, from Eltham, and a specimen of the second brood of *Hemerophila abruptaria*. Mr. Tutt, *Zygaena carniolica* from Bourg d'Oisans, France, which were almost without the creamy rings and had the abdomen entirely black—a combination of the ab. *diniensis* of H.-S. and the ab. *berilonensis* of Stdgr. Mr. H. H. May, a *Callimorpha dominula*, with yellow hind wings. Mr. Bayne, a var. of the female of *Argynnis paphia*, resembling *A. pandora* but without the reddish tinge; it was strongly tinged with the var. *valesina* green, especially on the hind wings; also a brown-suffused *valesina*; and a variety of the male, with the black marks forming short streaks, and the black spots at the ends of the wing-rays much enlarged. Mr. Prout, two examples of *Aporophyla australis* (var. *ingenua*), from Sandown, I.W.; also, on behalf of Major Robertson, dark forms of *Tephrosia bistortata* (*crepuscularia*) and *T. crepuscularia* (*biundularia*), which were quite distinguishable on account of the browner tone of the former. Mr. Heasler, a bred specimen of the light olive-green form of *Triphaena fimbria*, from Wimbledon. Mr. Southey, a series of *Heliothis armigera*, bred from larvæ found among tomatoes from Spain and Teneriffe. Mr. Pearse, a specimen of *Acidalia holosericata*, bred, 5th October, 1896, from eggs laid 25th June, 1896; also eggs and larvæ of that species. Mr. C. May (a visitor), a specimen of *Hibernia aurantiaria*, with a dark band similar to that on some specimens of *H. marginaria*; also a very brown suffused *Plusia gamma*. Mr. Bacot, drawings of hairs of larvæ of *Psilura monacha* and *Leucoma salicis*, to illustrate a paper read by Mr. D. C. Bate, on "Notes on the early stages of *Psilura monacha* and its allies."—Tuesday, October 20th, 1896. Exhibits: Mr. Oldham, a very light *Crocallis elinguaria*, and a strongly marked female *Heimera pennaria* from Epping Forest; also a short bred series of *Hypsipetes ruberata* from Cambridgeshire, and a specimen of the ichneumon, *Rhyssa persuasoria*, from Norfolk. Mr. Prout, a very dark *Luperina testacea*, eight *Caradrina ambigua*, and others, from Sandown. Rev. C. R. N. Burrows, a male *Epione apiciaria* with a broad purplish hind-marginal band on all the wings, the rest of the wing in both pairs being without the usual reticulations and of a very dark orange colour; also a small, reddish *Agrotis nigricans* almost without markings, and three *Orthosia suspecta* without the usual dots, but with transverse lines; all from Suffolk. Mr. Tremayne, a good specimen of a fungus, supposed to be *Agaricus procerus*, the parasol mushroom, from the New Forest. Mr. T. W. Jackson, *Syrichthus alveolus* var. *taras* (with a white central blotch on fore-wings), from Horsham, and a bred specimen of *Pyrameis atalanta* having two large suffused white spots near the apex of the fore-wings and a small white dot near the apex of hind-wings, the red band on the latter was without the usual black spots. Mr. T. F. Clarke, a sprig of the plant from which the so-called jumping-beans are obtained, showing

the "beans" *in situ*. Mr. S. J. Bell, two *Triphaena orbona* (*subsequa*) taken in the New Forest this year. Mr. Bayne asked whether any member had observed *Nisoniades tages* at rest at night. He noticed that when lantern-light was turned on this species it dropped its wings from the usual butterfly position to that known as the "penthouse" position. Mr. Tutt remarked that *Spilothyrus althaeæ* (a Continental species) when perfect rests with wings depressed, like a geometer; but when worn it raises them over its back. Mr. Tutt read a paper, "The Antennæ of Lepidoptera, their Structure, Functions and Evolution."—Tuesday, November 3rd, 1896. Exhibits; Mr. Oldham, *Plusia chrysitis* (one larger and one darker than usual), *Plusia iota* and *Anthocaris cardamines* (with exceptionally small central spots), all from Wisbech; also a very long and variable series of *Triphaena pronuba*, taken in his garden at Woodford, during the years 1892-95, and a small pale specimen of *Naenia typica* from the same district. Mr. H. H. May, three male and three female *Boarmia repandata*, var. *conversaria*, from Lyndhurst, June, 1896, and a male *Himera pennaria* with the wings of a suffused smoky brown, and the apical white spot rather larger than usual. Mr. Tutt, specimens of *Xanthia ocellaris* and *M. gilvago* for comparison, to show that they could not well be mistaken for each other, although the fore-wings of *gilvago* are occasionally somewhat pointed. Captain B. B. Thompson then re-opened the discussion on *Bombyx quercus* and *B. callunae* (continued from May 5th last), and exhibited these species. The discussion was continued by Mr. Tutt, who gave a summary of extracts from the "Record," and Messrs. Bacot, Bayne, Nicholson, Prout, J. C. Warburg and others, many of whom exhibited their series. Mr. Warburg's exhibit also included long bred series of *B. spartii* from the south of France. Messrs. W. Hewett, of York, and A. Horne, of Aberdeen, also very kindly sent most beautiful series of *B. callunae* from their respective localities for exhibition. From the general mass of the evidence brought forward, it seemed probable that *B. quercus*, *B. callunae* and *B. spartii* are all local varieties of one species, as there appeared to be no character whatever sufficiently constant to enable them to be infallibly separated. Mr. Bacot said that he had opened an egg of *Pamphila* (*Hesperia*) *comma* on October 11th last, and had found the young larva fully developed within.—*C. Nicholson and L. J. Tremayne, Hon. Secs.*

South London Entomological and Natural History Society.—October 22nd, 1896, Mr. C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. A. F. Potter, of Whangarei, Auckland, New Zealand, was elected a member. Mr. R. Adkin exhibited a series of *Hadena adusta*, from Shetland, very beautifully marked. Mr. Ficklin, bred specimens of *Luperina cespitis* from larvæ taken on grass stems in the spring. He suggested that their small size was due to the proper food being grass roots and not the green blades. A large number of specimens of *Tephrosia crepuscularia* and *T. biundularia* were shown by Messrs. Tutt, Henderson, Barrett, Auld, Mera, Mansbridge, de V. Kane, Tunaley, H. Williams, and Chittenden, forming such a collection of forms as, in the opinion of all present, had never been before brought together. In reply to Mr. Barrett's re-assertion, based on Mrs. Bazett's captures, that these two are one species, Mr. Tutt read a very exhaustive paper. He assumed that the earlier species should be termed *T. bistortata* and the later one *T. crepuscularia*, as Mr. Prout asserted, and said that the difference of opinion among entomologists was largely a matter of the definition of a "species." They each had distinct life-cycles, distinct facies and one had seasonal dimorphism, besides which each bred true to its own race. He showed that errors had arisen from statements made on insufficient data and from too much reliance being placed on various authors' writings, such as those made in Newman's "Moths." He reviewed the discussion which took place some ten years ago in the magazines, and said that the concensus of opinion then was the same as his own. The opinions of the chief opponents were then discussed in detail, especially the various contributions of Mr. Barrett to the discussion. He showed by quotations that Mr. Barrett had accepted the idea of two species until he recently received certain specimens and data from Mrs. Bazett, including some supposed second brood *T. biundularia*. After stating that these were undoubtedly *T. crepuscularia* second brood, he referred to the evidence offered as to distinctness by Messrs. Porritt, Fenn and Tugwell, who had bred both species, and pointed out the differences which separated the two. He showed that parallelism was not a sign of unity of species, nor was it right to compare dates of years like 1888 with 1893. He discussed the Scotch forms, and remarked that they more nearly resembled the German specimens. Mr. Henderson said that he had taken *T. crepuscularia* in the very woods where it was stated by Mrs. Bazett not to occur. His experience and remarks agreed wholly with Mr. Tutt's, and he mentioned that the late Mr. J. A. Cooper had reared a second brood of *T. biundularia*. The remarks made by the other exhibitors all tended to support the case as put forth in Mr. Tutt's paper. Mr. de Vismes Kane sent an account of the occurrence of the only species (*T. biundularia*) occurring in Ireland, together with a typical exhibit. In reply to the vote of thanks proposed by Mr. Barrett and seconded by Mr. Auld, Mr. Tutt said that the idea of species was simply a matter of utility, and as there were two distinct life cycles, it was more convenient to consider them as two species, although they might be very closely allied. Mr. Montgomery reported that there was considerable doubt about his record, on September 24th, that *N. diptrapezium* occurred in Yorkshire.—*Hy. J. Turner, Hon. Report Secretary.*

North London Natural History Society.—Thursday, October 8th, 1896, Mr. C. B. Smith, President, in the chair. Exhibits: Mr. Woodward, abnormity of *Arctia plantaginis* having the last pair of legs replaced by wings; Miss Nicholson, fruit of the jessamine; Mr. C. B. Smith, *Macroglossa fuciformis*, *M. bombyliformis* and *Bombyx trefolii* from Lydhurst, *Macroglossa stellatarum* from Cromer and *Ellopia prosapiaria* from Oxshott. Mr. Goymour recorded the capture of a specimen of *Catocala fraxini* at rest on the trunk of a lime tree in the Stamford Hill district, on September 27th. The insect measured four inches across the wings and was in very fair condition. Mr. R. W. Robbins opened a debate entitled, "Transplantation—is it justifiable?" He took a decided affirmative, and maintained that transplantation was justifiable in all cases, excepting when practised for fraudulent and dishonest purposes, and frequently advantageous. In agriculture and many other instances there was no disagreement between himself and his opponent; the main objections to scientific transplantation

appeared to be (1) that it destroys the balance of nature; (2) that it hinders scientific work. But, said Mr. Robbins, the balance of nature is being inevitably destroyed by man every day in the ordinary course of his existence. It is perpetually fluctuating in all well-populated countries. The effect of our own small scientific transplantations would practically not be felt among all this fluctuation. Dealing with the second objection, Mr. Robbins said that he presumed the scientific work chiefly hindered by transplantation was the compilation of local lists and the study of the phenomena of distribution deduced from them. This seemed a serious consideration, but the hindrance was more apparent than real. In a country like our own, the fauna and flora are already so well known that any introduction is quickly recognised as such, and if the introduced species thrives, it enriches our fauna and flora, and provides us with additional scientific material, without creating confusion. An artificially introduced species would have no chance of survival if the conditions were not similar to its native haunts. Moreover, transplantation was often of great use in preserving a rare species, and might sometimes be necessary to ascertain facts by experiment. In conclusion, Mr. Robbins recommended the introduction of various conifers into Epping Forest, and the re-establishment therein of the White Admiral and Silver Washed Fritillary, and said that, quite apart from utility, he considered almost all genuine work of this kind justified by the increase of beauty and interest which might thus be provided in the world around us. Mr. Prout replied in the negative. He agreed with Mr. R. W. Robbins that transplantation was of course justifiable under certain circumstances, but objected to it as a practice, and claimed that unless from the point of view of a naturalist it could be proved perfectly harmless, the point of view of the artist, or that of the utilitarian, could not come at all before the consideration of the meeting. He proceeded to contend that our mission is to study nature, not to improve upon her. Many of the most important scientific problems in natural history are worked out chiefly or entirely on data of geographical distribution; and no naturalist has any right to hinder or even risk hindering the progress of scientific research in the department of which he professes to be a devotee, merely for the sake of some selfish gratification or even for the sake of giving pleasure to lovers of variety in natural surroundings. Transplantation, without the fullest publicity, is an offence against scientific knowledge. Transplantation to save extermination is chiefly or entirely within the same district. Transplantation to restore extinct forms is indefensible. Accidental transplantation is sometimes inevitable, but that of course was not under consideration, and is generally too inconsiderable in extent to do any serious harm. Summing up, Mr. Prout said that biological science demands accurate data of geographical distribution; that transplantation, especially of the more obscure forms of life, can hardly possibly be made so public that all consequent error is avoided; and only too often, if naturalists do not set their faces firmly against the whole practice, there will be found those who are willing to transplant with the intention to deceive; and a very fruitful source of error and trouble be thereby created. Mr. Bacot said that this question of transplantation applied also to man. He himself was an outcome of transplantation, as instanced by the Huguenot immigration, which had probably not resulted in the increased happiness of their descendants, but he fancied it had been on the whole to the advantage of the English race. Of course transplantation was justifiable on any and every plea. Certainly on precedent, for man had transplanted himself in every age, though not always successfully. With regard to transplantation causing difficulties in settling the geographical distribution of animals and plants, Mr. Bacot asked whether Mr. Prout would consider, because one hundred or one thousand specimens of any given species were to be found in a certain district, that this would prove them to be firmly established in the country. Would he not try to discern if the environment were suitable to all, and whether any might have been transplanted by some agency other than its own, before considering the point settled? After reading a modern work on the distribution of organic life, is it not patent that every portion of the globe must be visited occasionally by winged or finned animals or seeds, and that there are numberless chances of getting from place to place for species which do not possess these advantages? Was not the crucial question of distribution rather one of suitability of environment and adaptability of the organism than of actual opportunity of the plant or animal in one or another stage to reach any particular destination. There were, of course, exceptions to this, but they were not so numerous as might be supposed at first consideration. The question being subsequently put to the vote, the meeting decided in the affirmative. — Thursday, October 22nd, 1896. Mr. C. B. Smith, President, in the chair. The exhibits chiefly comprised specimens of *Hypsipetes sordidata*, which were shown by Messrs. C. Nicholson, Prout and R. W. Robbins. Mr. Prout, beside his own cabinet drawer of the species, showed interesting variable series, lent by Major Robertson, of Cheltenham and Mr. G. T. Porritt, of Huddersfield, the latter being bred examples of the small bilberry-fed form. Mr. Prout also exhibited a short series of *Caradrina ambigua*, two specimens of *Lucania albipuncta* (one very red the other quite grey), and a strongly marked specimen of *Mamestra abjecta*, all captured at Sandown, in 1896. Messrs. C. Nicholson and L. J. Tremayne reported Lepidoptera practically absent, and recent weather execrable, from North Wales and the New Forest. Mr. Prout read a paper on "*Hypsipetes sordidata*," the name of which he said would probably have to be altered, for that of *furcata* had a better title in accordance with the law of priority, and he expected a still older term would be unearthed. The paper dealt with the nomenclature and variation of the species, and included an excellent rough table of its various forms. Regarding its differentiation, Mr. Prout said that Guenée's pale spot on the outer band was not absolutely reliable, nor, he was afraid, was Meyrick's differentiation, but the general aspect of the insect was so different from that of *H. trifasciata* and *H. ruberata*, that no distinguishing character need be selected. The species was essentially a northern one, though common all over the British Isles; but local on the Continent, disappearing altogether as one proceeds southwards. Mr. Prout also narrated its life-history, and informed the meeting of the incorrectness of Newman's account, that the young caterpillars emerge from the egg in twelve days and hibernate half-grown. He described how he had been led to doubt this by noticing (1) the development of ovipositor in the female, which suggested secure concealment of the eggs, which would hardly be necessary if they were to hatch in twelve days,

and (2) the entire change of habit of the larvæ which would be necessitated in the spring when it took to its concealed mode of life as compared with the open feeding on mature sallow leaves which was assumed for the autumn. The fact was, of course, that the insect hibernated in the egg. He also was not disposed to agree with Newman that the larvæ grew very rapidly. Its normal period could not be much under two months, and some of the lavæ probably took a good deal longer. This growth could not be considered rapid, when compared with *Melanippe fluctuata, M. sociata, M. galiata, Anticlea rubidata, Coremia designata*, and many others, all of which could go from egg to pupa in about three weeks. His dates for the species ranged from May 30th to September 15th, but the early dates were all for bred examples, and he had not met with it at large before the beginning of July.—*Lawrence J. Tremayne, Hon. Secretary.*

Natural History Society of Glasgow.—At the opening meeting of the forty-sixth session on September 29th last, Mr. R. Kidston, F.R.S.E., F.G.S. (and subsequently Mr. Peter Ewing, F.L.S.), occupied the chair. Before proceeding to the business of the evening, the Chairman made feeling reference to the loss the Society had sustained since its last meeting in the death of its President, Professor Thomas King. A memorial notice was read by Mr. D. A. Boyd, in which, after giving an account of Professor King's early days, education, and career, he referred to the various offices which he held in scientific societies at the time of his death. Mr. Joseph Somerville intimated the death of Mr. Alexander Mitchell, Belhaven Terrace, a member of the Society. Mr. Andrew Gilchrist, Darvel, sent for exhibition the sickle medick, *Medicago sylvestris*, Fries, from Heads of Ayr, Maybole parish, where he and Rev. D. Landsborough, Kilmarnock, had found the plant abundant in August last. Fresh specimens of the two British species of water parsnip, *Sium*, were laid on the table; *S. erectum*, Huds., by Mr. Gilchrist, from Galston parish, a new Ayrshire station; and *S. Latifolium*, L., by Mr. D. Dewar, curator of the Botanic Gardens, from a root brought twelve years ago by Mr. C. Sherry from the Royal Canal, Dublin. Mr. A. Somerville, B.Sc., F.L.S., exhibited specimens, six feet in height, of *Cladium jamaicense*, Crantz (*C. Mariscus*, Br.), the most handsome of British Cyperaceæ. This plant, a new record for the South Inner Hebrides, has been found last month by Dr. T. F. Gilmour and Mr. Somerville growing luxuriantly in a small, sheltered loch on the Kildalton estate, Island of Islay.

## NOTICES OF SOCIETIES.

North London Natural History Society.—The following are amongst the fixtures for next session:

Jan. 2.—Fifth Annual Exhibition.
„ 14.—Presidential Address.
„ 28.—Short Papers on 1896.
Feb. 11.—Discussion on "Overcrowding and its Remedies." Opened by L. J. Tremayne.
Mar. 27.—Visit to the Epping Forest Museum.
Apr. 8.—Discussion: "The Filices or Ferns." Opened by R. W. Robbins.
May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.,
„ 15.—Whole-day Excursion to Brentwood.
„ 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
„ 10.—Debate: "Is Vivisection Justifiable?"
„ 19.—Half-day Excursion to the Lea Valley.

There will also be a special-family discussion entitled, "The Liparidæ," to be opened by Mr. A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid.* Duplicate only to be sent, which will not be returned. The specimen must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Wanted, crustaceans, sponges, foreign shells and other natural history objects. Offered, healthy canaries, scientific books, fine photo micrographs and negatives, micro slides (anatomical, pathological, botanical).—H. W. Parritt, 8, Whitehall Park, N.

British and foreign land, freshwater and marine shells, to exchange for foreign land shells or British marine shells not in collection, or postage stamps.—A. Hartley, 14, Croft Street, Idle, near Bradford, Yorks.

Good gannet skin, lantern photo flower slides, oolitic coral, micro slide labels. Wanted, set of British insects, books, micro insect slides, or offers.—Chas. J. Watkins, King's Mill House, Painswick, Gloucestershire.

Polished geological and other specimens, British and foreign shells, fossils, microscopic slides, curios, minerals, Science-Gossip, 1890-1895 (few unpublished) offered; desiderata numerous.—A. Sclater, Natural History Store, Teignmouth.

"The Microscope" (Hogg's), "British Naturalist," vol. 2, and quantity of monthly photographic periodicals, Wanted, Newman's "Butterflies and Moths." Offers.—Thos. W. Wilshaw, 210, Myrtle Road, Sheffield.

Planorbis dilatatus, Pupa ringens, Vertigo antivertigo, Substriata pusilla and other good shells offered for recent Brachiopods, Woodward's "Mollusca," or other conchological works.—J. A. Hargreaves, 3, Ramshill Road, Scarborough.

Large collection of marine and land shells, including many rare Helices from New Guinea, Philippines and Borneo, offered in exchange for exotic Helices; send lists.—Miss Linter, Arragon Close, Twickenham.

Eggs in Clutches.—Cormorant, shag, razorbill, oystercatcher, moorhen, kestrel, sparrow-hawk, magpie, jay, greenfinch, sedge-warbler, lesser redpole, skylark, titlark, hooded crow, woodcock, nightjar, long-tailed tit, lesser black-back, herring-gull, kittiwake; also a number of chough. Wanted, other eggs in clutches, U. margaritifer, for other shells or postage stamps.—Rev. W. W. Flemyng, Coolfin, Portlaw, Ireland.

Spectroscope and accessories, by Browning, quite new; sell or exchange.—George Henry Proctor, 44, Ampthill Square, N.W.

# DACTYLOPIUS OR MEALY-BUGS.

WITH A NEW SPECIES.

BY T. D. A. COCKERELL.

THE interesting creatures known to horticulturists as mealy-bugs, a genus of Coccidæ, have not received the study they deserve in Europe. While Mr. Maskell has been carefully describing the numerous species found in Australia and New Zealand, those of Europe, left in a rather unsatisfactory condition by Signoret, have been let alone until quite recently. As a result of this neglect, Mr. Newstead, of the Grosvenor Museum, Chester, has been able to describe new species from England, Ireland and Wales, and no doubt there are others to be found. The first of these, *Dactylopius walkeri*, Newst., was made known in June, 1891, from specimens found on *Agrostis vulgaris*, at Manley, Cheshire. The second, *D. hibernicus*, Newst., published in July, 1895, was found by Miss Tomlin, on grass at Ballintoy, Co. Antrim, Ireland. The third, *D. radicum*, Newst., published October, 1895, is from Puffin Island, Anglesea, on *Armeria vulgaris*. All the descriptions, with figures, will be found in the "Entomologist's Monthly Magazine" for the dates mentioned. If these discoveries are not enough to stimulate the British microscopists to activity, it may be added that recent researches have brought to light new British Coccidæ of several genera other than *Dactylopius*. Only the other day I received from Mr. E. Ernest Green specimens of *Rhizococcus devoniensis*, Green MS., n.sp., found at Budleigh Salterton, Devon, on *Erica cinerea*.

DACTYLOPIUS LICHTENSIOIDES in sac on twig of *Artemisia*.

Not only may native species be studied in England, but our hothouses are very frequently the abode of exotic coccids. There are ten species of *Dactylopius* which were described from specimens found in Europe on hothouse and garden plants, their native habitat being still unknown or uncertain. So during the winter the entomologist who will turn his attention to these little-known creatures will not fail to find material for study in hothouses, with every prospect of interesting discoveries before him.

Unfortunately there is no work existing which will enable the student to readily determine his coccids. For the English reader, the most convenient guide to the subject is Maskell's little book on the scale insects of New Zealand, published by the New Zealand Government, in 1887. A check-list of the species of Coccidæ known up to the present time (about 800) may be obtained from Professor S. A. Forbes, State Laboratory of Natural History, Urbana, Illinois, U.S.A. However, the present unsatisfactory condition of things is not to last very long. Mr. R. Newstead has in preparation a fully illustrated monograph of British Coccidæ, which, I believe, is to be shortly published by the Ray Society. It will include not only the native species, but those found in hothouses, and will doubtless contain an immense amount of new and valuable information.

The typical female *Dactylopius* is a small elongate oval creature of a yellowish or brownish colour, more or less besprinkled with a mealy secretion, possessing six legs and antennæ of eight joints, of which the last is conspicuously longer than those immediately before it. The body terminates in the two rounded lobes, which are not produced or cylindrical; from them arise setæ, which are sometimes covered with the mealy secretion, so that the insect has two white tails. The sides of the body often show a lot of little mealy tufts. All these characters should be observed with a lens in the living insect, which must then be boiled in a solution of caustic soda or potash until it is clear, and examined by transmitted light under the compound microscope for the minute details of the legs, antennæ, etc.

The genus *Dactylopius*, however, has been made to contain a number of curious forms differing very materially from the above description. This year, Maskell has separated three such under a new generic name, *Lachnodius*, giving excellent reasons for so doing. Doubtless, other genera will have to be erected, but the time is, perhaps, hardly ripe for a new generic classification of the Dactylopiine series.

One of the aberrant forms reached me a few weeks ago, and when I saw it I thought it was a new *Lichtensia*, belonging to a group entirely different from the mealy-bugs. As it has not been published, I will give the description of it here.

DACTYLOPIUS LICHTENSIOIDES, n.sp.

Female, purple-black, slightly mealy, covered by a firm globular white sac, about 3 mm. long and high, like a *Lichtensia*; general form of insect, oval; when boiled in caustic soda, it stains the liquid dark purple-black. Legs and antennæ very minute, pale brownish. Antennæ moderately slender, of about equal width from second to seventh joint;

seven-jointed, formula 7142(36)5 [1]; 4 is noticeably longer than 3, but 3 is not very much shorter than 2; 5 is nearly as long as 6, it is longer than broad; 7 is longer than 4 and 5. Rostral loop short, about as long as an antenna. Legs short, femur rather stout, tibia and tarsus shorter than femur and trochanter. Tarsus only a little shorter than tibia. The legs of the adult female are stouter, but only the merest trifle longer than those of the embryonic larvæ within her body. The antennæ of the adult are considerably longer than those of the embryonic larvæ, but not twice as long. Claw moderately long, slightly curved, broad at base. Anal ring with six hairs. Caudal tubercles extremely low, almost obsolete, each with a bristle resembling those of the anal ring, seven to nine short spines, and round gland orifices. Tarsal digitules filiform not very long, with minute knobs. Digitules of claw rudimentary, very short. Claw with a denticle on its inner side.

Some of the specimens are attacked by a fungus.

Embryonic larva turns dark violet in caustic soda. Antennæ six-jointed, 6 much longest, formula 6(1235)4.

Lately hatched larva, pinkish-brown, with pale yellowish legs and antennæ. Larvæ hatching in October.

Habitat—Fort Collins, Colorado, on flowering stems of *Artemisia frigida*; September, 25th, 1896. Collected by Professor C. P. Gillette.

Another curiously abnormal species which might form the type of a new genus is *Dactylopius nipæ*, Maskell, which should be looked for on palms in English hothouses. It was originally described by Maskell and Newstead, in 1893, from specimens found in Demerara. Mr. Urich has found a slight variety of the same species in Trinidad, on midribs of guava leaves, tended by an ant, *Azteca chartifer*, Forel MS. Professor Davis has met with it on palms in a hothouse in Michigan, U.S.A. I will quote an unpublished description by Mr. Pergande, of the United States Department of Agriculture, made from the Michigan specimens:

DACTYLOPIUS NIPÆ, Maskell.

"Adult female; colour, bright red or orange; shape, broadly oval; length about 2 mm., diameter about 1·4 mm., exclusive of the excretion. Excretion white or sometimes slightly yellowish on the dorsum. Excretion short, but dense, forming four dorsal rows of somewhat squarish, stout, conical tubercles, and a fringe of, apparently twenty-four, white projections around the entire margin; those of the head and thorax are shortest and broadly triangular in shape, while those of the abdomen are much more slender, cylindrical and of an elongated conical shape, all are directed backwards and become gradually somewhat longer and more slender towards the end of the body. The characters of the adult females, after boiling in potash, are as follows: Antennæ seven-jointed; the last joint being much the longest and almost equal in length with joints 4–6 combined. Joints 2–4 are sub-equal in length, with the third slightly shorter than the other two, each of them being longer than any of the others; the fifth being shortest of all. Legs rather stout, especially the femora. Femora and tibiæ nearly equal in length; tarsi somewhat shorter than tibiæ and provided with four knobbed digitules. Anogenital ring with six stout bristles, and one bristle at each of the anal lobes. There are also numerous small pores or spinnerets distributed over the whole body intermixed with a few short, stout spines; a pair of still longer and stouter spines may also be observed on each side of the thoracic and abdominal segments, and quite a number on the head and anal lobes.

"Male: length about 0·8 mm.; colour, yellow, the head somewhat reddish; eyes, purplish; antennæ, brownish-yellow; disk of thorax more or less distinctly dusky, with the lateral margin of the different parts blackish. Legs yellow, with a dusky tinge. Style, short, conical, with two long and fine bristles each side of it. Antennæ ten-jointed, the third, sometimes also the fourth and the last joint, longest. Wings faintly brownish, particularly along the costa and towards the base" (Theo. Pergande, MS.)

On comparison with Maskell's description, the Michigan specimens exhibit slight differences, which Mr. Pergande summarises thus:

"Maskell says that the antennæ are either seven or eight-jointed; in this species, however, of which twenty-two specimens were prepared, there are uniformly but seven joints in all the examined specimens. He states also that the third and penultimate joints are slightly longer than the rest, whereas in the specimens before me the second, third and fourth are somewhat longer (together) than the seventh, the third being slightly shorter than the second, while the fifth is shortest of all."

Mr. Urich's Trinidad specimens showed the tibia distinctly longer than the tarsus; the legs became colourless on boiling. The antennæ were seven-jointed, 7 longest, and a *little* longer than 4 and 5; 4, 5, 6, equal; 3 nearly the same, but a little *shorter*; 2 longer than 3 or 4, but shorter than 7. Formula 72(1456)3. In another example joint 3 was as long as 2.

After comparing the descriptions of Maskell, Newstead and Pergande, and examining specimens, I am quite satisfied that we have to do with a single very distinct but variable species.

I have introduced the above descriptions, not only as a contribution to the knowledge of the subject, but to indicate the characters which are used in the identification of mealy-bugs. In conclusion, I will give a list of the mealy-bugs found in Europe up to the present date, whether native or in hothouses.

(1) *Dactylopius alaterni*, Signoret; on *Rhamnus alaternus*. A doubtful species found in France.

(2) *D. caricus*, Gennadius; on *Pinus*. Not found in Europe proper, but in Asia Minor. Two millimetres long, reddish, covered with a cottony substance. A quite imperfectly-known species.

(3) *D. ceratoni*, Sign.; in the Maritime Alps. Similar to *D. vitis*.

(4) *D. citri*, Risso; south of France, Italy, etc.; on *citrus* and a variety of other plants. A common greenhouse species with little cottony

[1] The antennal formula is made by enumerating the joints in the order of their length, beginning with the longest and bracketing together those of equal length.

filaments round the body, but without long cottony tails.

(5) *D. adonidum*, L. = *longispinus*, Targ. Differs from the last by having two very long, slender, cottony tails, as well as two others not so long. It is also a common greenhouse species. A most elaborate account of this and the last species has been lately been published by Berlese, the Italian entomologist.

(6) *D. ficus*, Sign.; on fig at Hyères and Nice. About twice as large as *adonidum*, to which it is allied.

(7) *D. indicus*, Sign.; on *Laurus indicus* at Nice. Resembles *adonidum*. When boiled in caustic potash it gives a crimson colour.

(8) *D. lavandul*, Sign.; in the south of France; no roots of *Lavandula staechas*. Brownish-yellow, 2 to 3 mm. long, the lateral, cottony fringes not much developed.

(9) *D. robiniæ*, Sign.; at Hyères, Cannes, Nice and Mentone; on the so-called acacia.

(10) *D. viburni*, Sign.; south of France, Maritime Alps and Hyères; on laurustinus. Similar to *D. citri*.

(11) *D. vitis*, Niedielski. Has been quite a pest where grape-vines are grown out of doors. Very near to *adonidum;* possibly not a distinct species.

(12) *D. walkeri*, Newst. See above. Gives a crimson colour in potash.

(13) *D. hibernicus*, Newst. See above. Differs from other European species in constructing a complete felted sac, which covers it.

(14) *D. radicum*, Newst. See above. Subterranean, pale reddish-pink, very elongate. Peculiar in having only seven joints to the antennæ, like the aberrant forms above described.

(15) *D. bromeliæ*, Bouché. A greenhouse species, found on various plants. Its identification is rather uncertain; probably two or more species have been confused under this name.

(16) *D. cyperi*, Sign.; on *Cyperus papyrus*. Resembles *adonidum*.

(17) *D. hoyæ*, Sign.; on *Hoya carnosa* in the greenhouses of the Duc de Vallombrosa, at Cannes. Resembles *adonidum*.

(18) *D. liliacearum*, Bouché; on *Amaryllis, Crinum, Pancratium*, etc., in cultivation. Imperfectly known.

(19) *D. mamillariæ*, Bouché; on species of *mamilaria* in cultivation. Resembles *adonidum*, but generally smaller, and there is a difference in the antennæ. The *Westwoodia mamillariæ*, of Targioni-Tozzetti, is supposed to be a different species, and if valid will need a new name.

(20) *D. perrisii*, Sign.; found at Mont-de-Marsan. Yellow, with white powdery secretion; length, 5 mm., breadth 1½; was made the type of a new genus *Westwoodia*; also called *Signoretia* and *Bergrothia*. All these generic names are preoccupied, and a new one is required if the insect is removed from *Dactylopius*.

(21) *D. pteridis*, Sign.; on *Pteris argyrea*. Resembles *adonidum*.

(22) *D. tuliparum*, Bouché. Imperfectly known. Said to be smaller, more depressed, and narrower than *liliacearum*.

(23) *D. theobromæ*, Douglas; on *Theobroma cacas*, in the Royal Botanic Society's Garden in Regent's Park. Hardly differs from *citri*, except that joint 7 of antennæ is considerably shorter than 2. (See Ent. Mo. Mag., July, 1889, p. 317.)

(24) *D. zamiæ*. Lucas. A greenhouse species, on *zamia spiralis*; supposed to come from Australia. Imperfectly known.

Descriptions of most of the above will be found in Signoret's famous "Essai sur les Cochenilles." Of scarcely one-fourth of them can it be said that we have anything like adequate knowledge, Several may not prove to be valid species, when they are properly known.

*Mesilla, New Mexico, U.S.A.;*
*October, 19th*, 1896.

## HABITS OF DORMICE.

ON the 26th of October, whilst walking through some underwood, I stepped on what proved, by examination, to be a nest of the common dormouse (*Myoxus avellanarius*) containing three young ones only a day or two old. I have found nests of this interesting little quadruped with young ones from May until the middle of September, but, as October seemed to be unusually late to find it breeding, I made some enquiries among the keepers here, and none of them remember having observed so late a brood. Bell, in his "History of British Quadrupeds," second edition, p. 284, says: "We have reason to believe that, in some cases at least, the dormouse has a second brood early in the autumn, as we have received from one locality, in the month of September, an adult one, one half grown, and three very young ones, apparently not more than a fortnight or three weeks old." Whilst on the subject of dormice, I may mention a singular fact that came before my notice in the spring of this year. From time to time, chaffinchs' nests which I found containing two or three eggs, on re-examination, had the interior very much disturbed, and the eggs either broken or quite covered up, and woven into the lining of the nest, this having caused the bird to desert it. I was much puzzled as to the cause of the mischief, until one day I osberved a dormouse busily employed in the occupation of a chaffinch's nest; and from what I then and afterwards noticed, have no doubt that these little creatures occasionally use such nests as a basis for their own. I have in my collection a nest so diverted, having captured the usurper in it.

David J. Rice.

*Squires' Farm, Westcott, near Dorking;*
*December*, 1896.

# ARTIFICIAL PRECIOUS STONES.

By W. Ernest Ord, B.A.

THE marvellous beauty of precious stones has appealed to mankind in all ages. In the East, where they are regarded with a superstitious veneration, the desire to possess them is almost a passion, and if with us this veneration has been diminished owing to more moderate views concerning their virtues, much of their original prestige clings to them. Few people, indeed, can regard, without being thrilled with admiration, a collection of beautiful gems, as they sparkle in the light and dazzle the eyes by a multitude of reflections. Nature, however, whilst exciting our admiration for these exquisite products of her skill, has granted them only in rare quantities to mankind, and the appreciation for them has been further increased owing to the mystery of their origin, and the impossibility, until recent years, of producing them artificially. With the progress of science it was inevitable that mankind could not rest content without inquiring into the composition and method of formation of these valuable treasures. Their rarity in nature has suggested the value of any method by which their artificial production might be successfully accomplished, and the investigations, so stimulated, have led to the discovery of certain methods by which many of the well-known precious stones can be produced in the laboratory of the chemist.

Success in the artificial formation of any natural substance is usually attained only when its constitution is well understood. Until its analysis into the elementary bodies composing it has been accomplished, and its constitution and properties thoroughly studied, no clue can be obtained as to the method by which it may be formed from more common materials. The natural history of precious stones, however, so far as known, does not afford much light as to their actual formation in nature. Their origin is, to some extent, shrouded in mystery. They are usually crystals, supposed to have been formed in rocks by a long process of cooling from a state of very high temperature, and they are generally found associated with such rocks as a "matrix," or else in the alluvial soil worn down from these rocks into the beds of rivers. The diamond, for example, occurs in a matrix of a kind of sandy freestone, though it is doubtful whether it has ever been found in the place where it was originally formed. The garnet occurs in granite and mica slate, and the ruby in the sands of rivers in Ceylon and in the famous ruby mines of Burmah.

The study of the chemical constitution and properties of precious stones is instructive and indicates the nature of the problem of their artificial production. They are found to be crystalline compounds, more or less complex, of familiar elementary bodies. The diamond, as is well known, is simply pure carbon crystallised. It is most valuable when perfectly colourless, and is then said to be of the purest water. It may, however, be blue, green, pink, yellow, or black. It is the hardest of gems, and is remarkable for its wonderful limpidity and high refractive power. Though permanent in its form, and unaltered under many varied conditions, it will burn in air at a high temperature, forming carbonic acid gas, the product of the combustion of carbon, whether as diamonds or in the coal of our fires. Many of the most valuable gems, again, are formed from the admixture of various substances with alumina. Alumina is the oxide of aluminium, the light metal now much in use, and it is the chief constituent of clay; but in the crystalline form, and when coloured by traces of other elements, such as chromium, it gives us rubies, sapphires and many other gems. Its combination with magnesia forms the spinels which are used for the jewelling of watches, and with glucina it forms the chrysoberyl. The emerald is found to be a compound of alumina, silica and glucina, coloured green by chromium, while the topaz, turquoise, garnet and beryl are all composed of alumina in combination with other substances. Silica, a form of which is the common sand of the sea-shore, when crystalline and coloured by minute traces of iron and manganese gives the beautiful amethyst, a transparent stone of a purple or violet colour. In combination with water, again, it forms the opal, which, owing to the diffraction of light its surface produces, exhibits a rich play of prismatic colours. The chalcedony, onyx and jasper are other stones of which silica is the chief constituent. To a different class of natural substances belongs the pearl, which is found in certain molluscs. It consists of concretions of carbonate of lime, formed in delicate layers around a foreign body, such as a grain of sand, which has found its way into the body of the animal, and against the irritation which it would occasion some protection is desirable. The pearl is found in different colours—white, yellow, pink and black. It is thus seen that these treasures, which appeal so strongly to the admiration of mankind, are composed of ordinary materials, but fashioned by nature's wonderful architecture in the most exquisite forms.

When we now turn to man's efforts to imitate these beautiful products of nature, we find that a

success, encouraging, if not complete, has been achieved. Though the hope of the alchemists of transmitting the baser metals into gold, and thus of discovering, in the exercise of the chemical art, a short cut to wealth, seems destined never to be realised, it is probable that the production of true diamonds in the laboratory of the chemist would seem to the alchemists at least equally marvellous. From an observation of the sudden increase of volume which the diamond undergoes at a high temperature, it was concluded that it was probably a form of carbon which had been subjected to great pressure when crystallizing. Pursuing investigations suggested by this and other considerations, Professor Moissan, of Paris, has succeeded in preparing diamonds similar in every respect to those formed naturally. In some earlier experiments, it was found that when charcoal (or carbon) is dissolved in various fused metals at the temperature of the electric furnace, it invariably crystallizes out in the form of graphite, and under increased pressure it forms black diamonds. In the process which eventually succeeded, an excess of charcoal and iron are melted together in the highest temperature of a specially contrived electric furnace, until the carbon is dissolved in the molten iron. The carbon and iron solution is then cooled by pouring it into just melted lead, in which, being lighter than the lead, it rises to the surface in globules. On removing the surrounding iron from these globules, the carbon contained therein appears in the form of true diamonds, possessing the hardness and density, the limpidity and high refractive power of the native diamonds. The stones so produced, though small, are in fact equal in every respect to those occurring naturally.

Many investigations have been made in the endeavour to produce by chemical means, rubies, sapphires, and other stones, but though true gems are produced, identical in hardness and composition with the natural stones, the brilliancy and beauty of the latter are not usually attained. Alumina has been fused with traces of chromium, and, by a long process of cooling, has crystallized in the form of rubies or sapphires, which were, however, of an inferior kind. Opals have also been obtained from solutions of silicates and the use of electric currents. Complete success has, moreover, been attained in the artificial formation of the spinels. By the aid of boracic acid as a solvent for their constituents, they have been obtained on removing the boracic acid at a high temperature, in crystals of great beauty, which could not be distinguished by any test from those occurring naturally.

Those artificial formations which have been most successful have only been accomplished by most difficult processes, involving very great expense. They are interesting chiefly as a remarkable instance of man's power to compete with nature in a field where she has been most mysterious and unapproachable. From the practical standpoint, the chemical methods have not much commercial value, for their expense and difficulty render the artificial stones more costly even than natural gems of the same size and quality. Possibly, however, in the near future, the chemist will be able to produce large and beautiful stones on demand, and the enormous prices now paid for natural gems of the kind will become a feature of the past. It seems probable, moreover, that, regarded as artificial products, precious stones will be dethroned from their unique position. Works of art, it is true, are greatly valued, and the skill exercised in their production adds greatly to the admiration they excite, but the excessive appreciation of famous gems is derived from considerations of a different kind. They stand alone and unrivalled in nature, and command respect, not only as most beautiful products of nature's marvellous skill, but also as rare specimens only granted capriciously to luckier members of mankind. We may, however, look to the time when large and beautiful gems may be produced at will, and all the secrets of their formation will become familiar; and while we rejoice at the extension of human power and knowledge, we must with some sadness admit that much of the poetry and romance associated with these treasures will be lost.

*Hawthorne Villa, Ferry Road, Edinburgh;*
*September 18th, 1896.*

THE DAVY-FARADAY RESEARCH LABORATORY.—It is nearly a year and a-half since Dr. Ludwig Mond, F.R.S., founded the Davy-Faraday Research Laboratory and presented it to the Royal Institution (see SCIENCE-GOSSIP, N.S., vol. i, p. 121). The interval has been applied in making the structural alterations and fitting the building with all the necessary appliances. The Laboratory was duly opened on the 22nd ult., by the Prince of Wales, and after the inaugural ceremony Professor Dewar showed experiments illustrative of the use of liquid air in scientific research. The Laboratory is for research in pure chemistry and physics. Only those will be admitted who have already done original scientific work, or who in the opinion of the Laboratory Committee are qualified to undertake it. Nobody is to be excluded on the grounds of nationality or sex, and admission to the Laboratory and the supply of gas, water and electricity, as far as available, will be free of charge. Lord Rayleigh and Professor Dewar have been appointed Directors of the Laboratory, and Dr. Scott will be the Superintendent.

# ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Continued from page* 181.)

IN speaking of *Plectopylis fimbriosa*, var. *azona* (*ante* p. 180), I stated that the only difference between its armature and that of the type, appeared to be that the palatal folds were shorter and that the tooth near the sixth fold was absent. Since writing, the Rev. Vincenz Gredler, of Bozen, Austria, who described the variety, has kindly placed two additional specimens at my disposal, and these confirm my statement. The specimens are, however, a little smaller than my own, measuring only 11 millimetres in diameter.

Mr. Gredler has also favoured me with three specimens of *Plectopylis invia*, two of which I opened in order to ascertain whether the second vertical parietal plate already referred to (*ante* p. 181) was constant, and as both specimens possess this plate, it may reasonably be inferred that it is a constant feature. In this connection, however, it is worth mentioning that Lieut.-Colonel Godwin-Austen (Proceedings of the Zoological Society, 1874, p. 609) records the presence of two vertical parietal plates in a specimen of *Plectopylis serica*, a species normally provided with only one vertical parietal plate, and he thinks that to this reduplication of structure is due the more compound forms of armature in the Burmese species of the genus.

The same naturalist draws my attention to the fact that there must be an error in the second locality (Dafla Hills), mentioned by me for *Plectopylis shiroiensis* (*ante* p. 156), as he believes that no European has been in those hills since he collected there, and he did not find the species in question. The shell I figured as from the Dafla Hills is, in Mr. Ponsonby's collection, so labelled, but, as it was collected by Mr. Godwin-Austen, the locality may now, on his authority, be safely altered to Shiroifurar, which is 150 miles from the Dafla Hills, and is the place from which the species was originally described.

*Plectopylis stenochila* (figs. 29 *a–d*), from Badung, in the Chinese province of Hoo-Pe, was described by Dr. von Möllendorff in the "Nachrichtsblatt der Deutschen Malakazoologischen Gesellschaft," 1885, p. 165, and in the "Jahrbuch" of the same society, xiii. (1886), p. 186. The shell is disk-shaped, with a slightly elevated spire, and is composed of six and a-half or seven whorls, which are closely coiled and increase very slowly and regularly, the last whorl descending a little anteriorly. It is very finely and regularly ribbed and decussated by fine spiral lines both above and below; in addition the periostracum is raised into deciduous plaits, which are especially conspicuous below, and form a laciniated fringe round the angular periphery. The peristome is white, a little thickened and reflexed, while the parietal callus forms a slightly raised, scarcely flexuous ridge which is separate from both margins of the peristome; the aperture is almost round and is without folds. The parietal armature consists of a somewhat strong vertical lunate plate, its convex side facing the aperture and

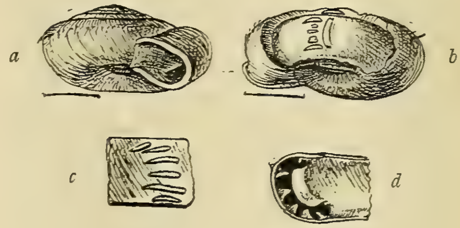



Fig. 29.—*Plectopylis stenochila.*

a little deflexed posteriorly at the lower extremity. On the anterior side there are, besides two short horizontal folds, one above and one below, in a line with the two extremities of the vertical plate, and between these two folds occur four small denticles, the two lower of which are united so as to form a double one (see fig. 29*b*). The palatal armature consists of six folds: the first, short horizontal and near the suture; the second, third, fourth, and fifth larger and stronger, parallel to each other and descending a little obliquely posteriorly; and the sixth again short, horizontal, and near the lower suture (see fig. 29*d*, which shows both armatures from the posterior side, and fig. 29*c*, which shows the inside of the outer wall with its palatal folds). The specimen figured is in Mr. Ponsonby's collection, and measures 8 millimetres in diameter. Mr. Gredler has favoured me with three additional specimens, which differ slightly from the one figured in having only one simple besides the double denticle on the parietal wall. The species is closely allied in its armature to *Plectopylis multispira* (*ante* p. 181, fig. 27), but the shell is smaller, more raised in the spire, and has one whorl less, while it is less shining and translucent than that species. On the other hand it is also allied to *Plectopylis murata*, to be considered in a future article.

*Plectopylis laminifera* (figs. 30*a-c*), from Hoo-Pe, China, was described by Dr. von Möllendorff, in the "Nachrichtsblatt der Deutschen Malakazoologischen Gesellschaft," 1885, page 164, and figured in the "Jahrbuch" of the same society, xiii.

(1886), t. 6, f. 1. The shell is somewhat solid, disk-shaped, with a conical spire, hornish brown, somewhat coarsely and regularly ribbed, and decussated with spiral lines above and below, but somewhat smoother below, and is widely, deeply umbilicated. It is composed of six and a-half regularly coiled whorls, which widen very slowly; the last whorl descends a little anteriorly, and is angulated at the periphery, which is provided with a coarse laciniated fringe. The peristome is white, a little thickened and reflexed, and the aperture is rounded, without armature, while the parietal callus has a raised flexuous ridge which is almost united to the margins of the peristome. The parietal armature consists of a strong vertical lunate plate, the convex side facing the aperture and only slightly deflexed posteriorly at the lower extremity. On the anterior side are found two short horizontal folds in a line with the two extremities of the vertical plate; midway between these folds is a denticle (see fig. 30*a*, which shows the shell with a part of the outer wall removed, exposing both armatures from the anterior side, and fig. 30*b*, which gives the posterior view, while fig. 30*c* shows the inner wall separately; all the figures are enlarged). The palatal armature consists of a small, short horizontal fold near the suture, and four stouter and larger, nearly horizontal folds, descending a little posteriorly (the second and fifth being a little longer than the third and fourth), and lastly, a short horizontal fold near the lower suture (see figs. 30*a* and *b*). The specimen figured is in Mr. Ponsonby's collection, and measures 14·5 millimetres in diameter. Mr. Gredler has kindly placed at my disposal five specimens, only one of which, however, has the median parietal denticle; two of the specimens measure only 11·5 millimetres in diameter, two others 14 millimetres, and one 13·5 millimetres;

a b c

Fig. 30.—*Plectopylis laminifera.*

they also vary a little in the height of the spire, some being more flattened than others. The species is closely allied to *Plectopylis fimbriosa* (see *ante* p. 179, fig. 24); its nearest ally, however, is *P. reserrata*, which we shall have to consider in a future paper.

Several other species of the Chinese group remain to be dealt with, but exigencies of illustration again compel me to break into the continuity of the series, and to revert to the Burmese and Indian species.

*Plectopylis serica* (figs. 31*a-c*) was described and figured in the "Proceedings of the Zoological Society," 1874, p. 608, t. 73, f. 5, by Lieut.-Colonel Godwin-Austen, who first collected specimens on the peak of Henozdan, Burrail range, Naga Hills. Later he again found it abundant above 5,000 feet on the same range, as far east as the Kopameda ridge. He further states that it is essentially a forest species, found in the dead leaves and moss. The species was also

a b c

Fig. 31.—*Plectopylis serica.*

figured in Hanley and Theobald's "Conchologia Indica," t. 132, ff. 8 and 9 (1875), but by an error the name was printed *sericata*. The shell is dextral, disk-shaped, with a slightly raised spire, and is composed of seven narrow, closely-coiled whorls. It is of a dark corneous brown above, paler below, with narrow, oblique brown bands, especially conspicuous below, running parallel with the lines of growth. A distinctly angular, raised ridge runs a little above the suture nearly to the apex, the last whorl being bi-angulated at the periphery. It is regularly and finely ribbed, and distinctly decussated by microscopic spiral lines. The last whorl descends but little anteriorly, the peristome is a little thickened and reflexed, the upper part of its outer margin being slightly inflexed; the parietal callus bears a very slightly raised curved ridge, which is united to the margins of the peristome, there being only a slight notch at the lower junction. The parietal armature consists of a single vertical plate, which descends a little obliquely towards the aperture; the upper extremity gives off on both sides a very short support, and at the lower extremity, also on both sides, a stronger support, the anterior one being a little lower than the posterior one (see fig. 31*a*). The palatal armature consists of five more or less oblique horizontal folds; the first is longest, flexuous, and descends a little posteriorly; the second is horizontal, and bifurcates posteriorly, the upper arm straight, the lower descending obliquely; the third, shorter, at first proceeding horizontally, about the middle deflecting obliquely at an angle of about 100 degrees; the fourth is a little longer, ascends a little at first and then deflects posteriorly at an angle of 90 degrees; the fifth is shortest, horizontal, near the lower suture and parallel to it (see fig. 31*b*, which shows the armatures, parietal and palatal, from the posterior side, and fig. 31*c*, which shows the inside of the outer wall, with its palatal folds; all the figures

are enlarged). Mr. Godwin-Austen (op. cit., p. 608) mentions six palatal folds, and his figure shows a small one near the upper suture, of which, however, no trace is found in the specimen now figured, which is from Sylhet, and is in Mr. Ponsonby's collection; it measures 11 millimetres in diameter. I have already alluded to the fact that Mr. Godwin-Austen found two vertical parietal plates in one specimen (*ante* p. 204).

*Plectopylis pinacis* (figs. 32*a-d*), from Sikkim, was described by Mr. Benson in the "Annals and

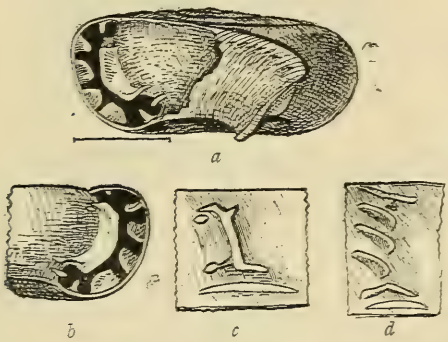



Fig. 32.—*Plectopylis pinacis.*

Magazine of Natural History" (3), iii, 1859, p. 268, and (3), v, 1860, p. 247. The shell was figured in Hanley and Theobald's "Conchologia Indica," t. 13, f. 5 (1870), and t. 84, ff. 1-4 (1872), while the parietal armature was figured by Mr. Godwin-Austen in the "Proceedings of the Zoological Society," 1874, t. 74, f. 1. Professor von Martens described what he thought was a new form, under the name of *Helix* (*Corilla*) *pettos*, in the "Malakozoologische Blätter," xv, (1868), p. 158, and this was figured by Dr. Pfeiffer in "Novitates Conchologicae," iii, (1869), t. 101, ff. 7-9; the type specimen, which is in the "Königliche Museum für Naturkunde," Berlin, was obligingly sent to me for inspection by Professor von Martens, with permission to open it; he suspected that it might probably be the same as *Plectopylis pinacis*, and upon opening the shell this proved to be the case, the armature being identical, while no differences could be detected in the shells themselves. Under these circumstances Professor von Martens' name becomes a synonym of the species now under consideration. The shell is sinistral, disk-shaped, pale corneous, widely umbilicated, finely regularly ribbed and decussated by spiral lines, composed of seven slowly increasing whorls, the last comparatively wide and a little deflexed anteriorly, and angulated at the periphery; the peristome is thickened and reflexed, its margins united by the slightly raised, very flexuous, ridge of the parietal callus, which has a slight notch at the junctions above and below. The parietal armature (fig. 32*c*), consists of a single strong vertical plate, which is strongly abruptly deflected anteriorly at the lower extremity, and gives off posteriorly a club-shaped support; the upper extremity gives off two slight supports, one on either side, the posterior one horizontal, and the anterior one a little lower, oblique, and very short; a little below the posterior support occurs a small denticle; a free, thin horizontal fold is found below the vertical plate; see also fig. 32*a*, which shows the shell with a portion of the outer wall removed, exposing the parietal and palatal armatures from the anterior side, and fig. 32*b*, which shows the folds from the posterior side. The palatal armature consists of: first, a thin horizontal fold near the suture; secondly, a stronger horizontal fold, deflexed in the middle; thirdly and fourthly, two shorter, but stronger, equal and parallel folds descending obliquely; fifthly a crescent-shaped fold placed obliquely with the concave side facing the aperture (the lower surfaces of these folds are seen in fig. 32*a*, their upper surfaces in fig. 32*b*); sixthly, a smaller horizontal fold, which becomes attenuated posteriorly (see fig. 32*d*); two minute, elongated denticles, one below the other, and placed at right angles to each other, occur between the first and second folds, near their posterior terminations. The specimen figured is from Darjeeling, and is in Mr. Ponsonby's collection; it measures 15 millimetres in diameter. A specimen in my collection, also from Darjeeling, measures 14 millimetres. Mr. Godwin-Austen's figure, quoted supra, shows a short free horizontal fold above the vertical parietal plate; no trace of this fold can be seen in either of the two specimens examined, neither does it occur in the specimen in the Berlin Museum.

*Plectopylis nagaensis* (figs. 33*a–d*), was described and figured in the "Proceedings of the Zoological

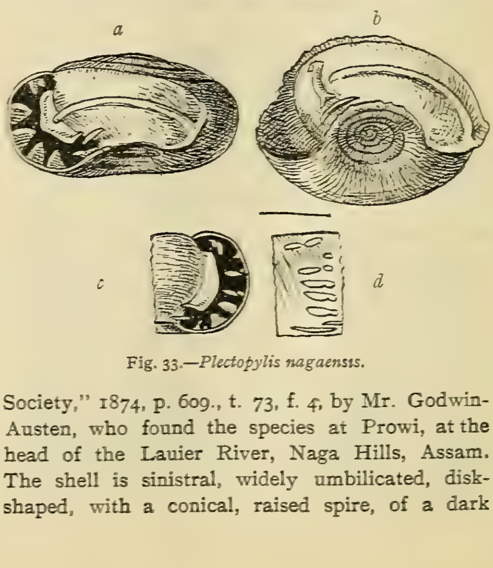



Fig. 33.—*Plectopylis nagaensis.*

Society," 1874, p. 609., t. 73, f. 4, by Mr. Godwin-Austen, who found the species at Prowi, at the head of the Lauier River, Naga Hills, Assam. The shell is sinistral, widely umbilicated, disk-shaped, with a conical, raised spire, of a dark

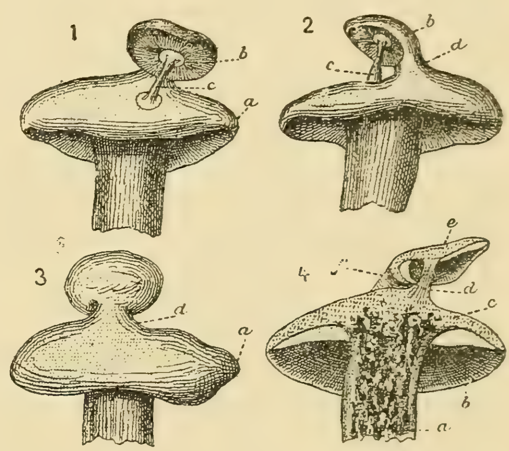
corneous brown, composed of seven closely-coiled, slowly increasing, rounded whorls, the last of which descends a little anteriorly. It is finely striated and decussated by microscopic spiral sculpture, scarcely visibly on the earlier whorls, but more apparent below. The peristome is white, a little thickened and reflexed; the parietal callus has a raised flexuous ridge separated, above and below, from the margins of the peristome. The parietal armature consists of a strong vertical plate, a little deflected posteriorly at the lower extremity, where it terminates in a short strong ridge; it has also a short support a little higher up on the anterior side, and another short ridge on the posterior side at the upper extremity. Below this plate is a free thin horizontal fold, and a little above the middle of the plate, a short distance from it, rises a strong horizontal plate, which runs parallel with the whorl, and descends a little at the aperture, where it is united with the raised ridge of the parietal callus (see figs. 33*a* and *b*, which shows the shell with part of the outer wall removed). The palatal armature consists of: first, a thin bilobed horizontal fold near the suture; secondly, a stronger horizontal fold, with a small denticle at its posterior termination (between these folds, in a line with their posterior terminations, is a minute denticle); thirdly, a horizontal fold, descending a little posteriorly, where it is slightly notched; fourthly, a similar horizontal fold, deflected posteriorly, finally slightly raised and notched; fifthly, a shorter but stronger horizontal fold with the posterior end more strongly deflected and also slightly notched; sixthly, a thinner but longer horizontal fold near the lower suture, attenuated anteriorly (see fig. 33*d*, which shows the inner side of the outer wall with its palatal folds). Between the posterior terminations of the fifth and sixth folds is found a very slight thin fold extending much further posteriorly than the main folds; this may prove not to be constant; it is not mentioned by Mr. Godwin-Austen in his description. The specimen figured is in Mr. Ponsonby's collection, and measures—major diameter, 11·5 millimetres, minor diameter, 10 millimetres, axis, 5·5 millimetres.

*(To be continued.)*

## ABNORMAL FUNGUS GROWTH.[1]

DURING the last days of October there was found in the Jura forests a fungus of the family *Russula*, which presented a very singular peculiarity on the pileus, where there grew a little on one side a small *Russula*, as indicated on figs. 1 and 2, strongly attached by its stipe and a portion of the rim of its pileus. No determined line of demarcation could be seen between the two individuals. Both were in a perfect state of preservation and were not in their first stage of growth; the collar, which would have indicated its specific name, had disappeared. The gills were untouched, as well as the underneath part of the pileus. The rim round the foot of the stipe of the smaller individual and the surface of the pileus was of a lighter colour. A vertical section of the two subjects (fig. 4) will show their thorough adhesion.

The tissue of the stipe of the small individual grows directly into the parenchyma of the



ABNORMAL FUNGUS GROWTH.

pileus of the larger specimen. It is difficult to explain this singular growth. Has the small *Russula* been accidentally thrown on to the large one, and has it by degrees formed one with it through points of contact, or has it developed itself completely at the expense of the organism which bears it by a sort of budding? Or, has a spore of a neighbouring *Russula* found on this pileus a favourable site to develop a mycelium out of which would have sprung the visible portion of the fungus. Fig. 1 shows us the position of the two mushrooms, the small one is seen with inferior view of the pileus. Fig. 2 indicates the position of the two fungi, showing the small one sideways. Fig. 3 indicates the position of the two fungi; the small one is seen by the superior portion of the pileus. We see in *a* the fungus bearer, in *b* the fungus born, in *c* the stipe of the fungus born, in *d* the point uniting a portion of the rim of the born fungus to the dorsal face of the pileus of the fungus bearer. Fig. 4 shows us a transverse section of both fungi. In *a* is the stipe of the bearer, *b* the lamels, *c* the pileus, *d* the stipe of the born fungus, *e* the pileus, *f* the point uniting the rim of the side of the fungi born to the bearer.

(1) From "La Nature," December 12th, 1896.

# THE DECIMAL CLASSIFICATION OF LITERATURE.

OUR contemporary "La Nature" has just published an admirable criticism of the decimal system of cataloguing literature as invented by Mr. Melville Dewey. The article, which is by M. Charles E. Guillaume, is so much to the point that we have translated it for this magazine. He writes as follows:

The idea which has been conceived by Mr. Melville Dewey of grouping all the human knowledge together, and then of sub-dividing it into ten successive parts, can be termed practical and odd at the same time. Why ten? Simply in order to allow a system of labelling in which each figure corresponds with a certain degree of generality. This arbitrary division into ten parts excludes the idea of a natural classification; there is no thought here of a philosophical creation, but simply the practical result to be attained in the rapid classification of publications, either books or papers, collected in libraries. Under this form of classification, Mr. Dewey's method could with more exactitude take the name of decimal labelling. We are very far from the classifications which were attempted by Leibnitz or Ampere, or even Auguste Comte. These were scientific, while Mr. Dewey's is solely administrative.

This point of view being clearly established it will be agreed that such a process was essential. Scientific publications are becoming so numerous that it is necessary to facilitate the researches of those who seek knowledge in any matter which specially interests them. For want of sufficient indication, which the title of a memoir does not always give, one is likely to escape many important publications, while one loses most valuable time in reading a long memoir in order to find the information one is seeking, and which is often absent. A figure is often more precise than a word, it fixes and settles the idea better.

The main object now is to pass by the most practical means from the project to its execution, to imagine the successive subdivisions which rigorously impose themselves, which comprise all knowledge and indicate its proper place without ambiguity. This is where the difficulty commences. According to countries, individuals, and their various methods of thought, the classification may vary indefinitely, and the system can only be considered good after it has been approved by a large number of specialists whose learning embraces the whole of human knowledge. It is quite impossible, in fact, to admit that the first scholar of the world, the most learned man that can be found on earth, is capable of fixing the details of a whole classification, were he even to devote to it the best years of his life.

The work of classification must, therefore, be a collaborative work, starting from the first division and following the lines fixed by Mr. Dewey; then proceeding more or less forward with the divisions, after the extent of knowledge in the divers branches of science is ascertained.

Specialists and some scientific societies have collaborated to the best of their abilities either to develop Mr. Dewey's classification, or to a remanipulation of his first propositions. The Royal Society of London has undertaken part of the work. The Société Française de Physique, on M. C. M. Gariel's proposition, has done its utmost to advance the decimal classification of the special sciences with which it occupies itself; but it is not without some slight modifications of Mr. Dewey's work that they arrived at a nearly satisfactory classification in detail.

In the New World people do not think as in the Old. Mr. Dewey, in his classification, shows more the habits of an engineer than a scholar. He lives amongst people where art has not yet found its place. To witness this, take one of his classes which includes the theatre, the opera, card games, riding and fishing—in one word, all that amuses and rests one, while one single class is devoted to music.

This is not said in order to criticise Mr. Dewey's work, but to give its character.

Let us pass to the detail of his classification. The first division comprises the ten following classes:—0, General Works; 1, Philosophy; 2, Religion; 3, Sociology; 4, Philology; 5, Sciences; 6, Applied Sciences; 7, Fine Arts; 8, Literature; 9, History. Each of these large classes is sub-divided into ten others, reserving always the figure 0 for the most general subjects. Thus No. 50 applies itself to Sciences in general, the following number serving to specify a grade in the generality. The nine classes corresponding to the figures from 1 to 9 after the figure 5 comprise the different sciences which are represented by their own special number, thus: 51, Mathematics; 52, Astronomy; 53, Physics; 54, Chemistry; 55, Geology; 56, Palæontology; 57, Biology; 58, Botany; 59, Zoology.

Let us further go into the matter and take Physics as an example. Under the figures 530 we will classify the publication on Physics in general, the didactic works, the treatises or dictionaries on Physics. Let us now follow the sub-division in one of the branches of Physics; heat being labelled 536. We will divide it after its nature, its effects, its relations with matter, its measure, etc. One of its sections bearing No. 6, will be calorimetry. We appear already to be very forward with No. 536,6; all Memoirs

treating of calorimetry will be placed in this compartment; but, if you were here to put a stop to the sub-division you would have a still very confused library under these four figures. The specific heats, the latent heats, the combustion heats, the instruments of all sorts, scientific or belonging to industry, being closely or widely connected with calorimetry, all group themselves under this title; which is still very general. We will therefore place the instruments in group 61, the determinations of specific heats under No. 62, and so on. We do not here exhaust our ten figures in order to preserve the nearly logical co-ordination of the different subjects. In short, as the methods of determinating the specific heats considerably differ, according to the state of aggregation of the bodies on which you operate, there is every reason to create further distinct sections, in which to place, in the following order, the measures of the specific heats for solids, liquids, and gases. Let us recapitulate: we receive a Memoir entitled "Determination of the Specific Heat of Sundry Ordinary Metals." We look over the successive divisions, classes, groups, and sections, which bring us to its exact compartment, proceeding as follows:

| | |
|---|---|
| Sciences - - - - | 5 |
| Physics - - - - | 53 |
| Heat - - - - | 536 |
| Calorimetry - - - | 536,6 |
| Specific heat - - - | 536,62 |
| Specific heat of solids - | 536,621 |

Assuredly you could still sub-divide in such manner that you should by seeing the figure know to which metal the work refers, on which basis of temperature the measurements have been effected, etc. But in wishing to do too well you would infallibly introduce into your classification a very great amount of complication.

It is preferable if you wish absolutely to fix the idea, to take the title of the memoir by another aspect and find out another grouping which is connected with the point left uncertain by our first classification, and which in our second will attain the required end. You wish, for instance, to expose the nature of the bodies on which the determination bears. You will then have recourse to Class 54, Chemistry, to Group 546, Inorganic Chemistry, where you will find metals in their proper order.

You will often need to have recourse to two groupings, either to perfectly describe the object of the memoir, or to indicate the different questions which are treated therein. For instance, a work on optical illusion can include independent researches on the organism of the eye, on the chemistry of vision, on judgment and its errors, and on many other subjects, without saying in the least that the memoir is in any way whatsoever written without method. In this case you will have to deal with as many classifications as the memoir treats of distinct subjects.

It is difficult to foresee what will be the result of Mr. Dewey's classification. It is just now occupying many who show plenty of goodwill towards it; some reviews have frankly adopted his system, and now start every article with its proper figure. It is certainly the best to adopt this course, in order to see whether the system has any life in it. To sulk against the method because it has a few imperfections would be quite as unreasonable as to admit it without restrictions; or without admitting certain modifications that experience will not fail to suggest. The best plan is to give it a thorough trial, free from prejudice, with the determined idea that some new classification is essential, and that the fact of Mr. Dewey's method, though it be partly artificial, must not for that reason estrange from him the sympathies of those who seek progress. We know what has become of all the natural classifications, though they emanated from first-class minds. Perfection is possible for a very short period only—while one only imperfectly sees but part of a question. In a more advanced stage of its study it branches out and penetrates into other departments. The relationships which were hidden at first become more evident; some phenomenon which was diminutive in the beginning becomes predominant in a group which binds the same subjects, and leaves the place it occupied in a natural classification. But if you deliberately abandon pure logic, the classification has more chances for a longer existence to attain its end. The idea transforms itself, but the label remains.

Dissecting Extraordinary.—The "Revue Scientifique" contains a curious instance of the heterogeneous contents of the stomach of an ostrich. A bird belonging to a menagerie travelling in America was dissected after its death, and the following were found in the stomach: the end of an umbrella (ferrule with a piece of wood), two keys (one of which was five inches long), a lady's comb, two pieces of coal, a silk handkerchief, three pebbles, two pieces of a beer-bottle, and a mouth-organ. In addition to this, cabbage, grass, lettuce, celery and earth. The bird succumbed from tuberculosis, not from indigestion as might have been surmised.

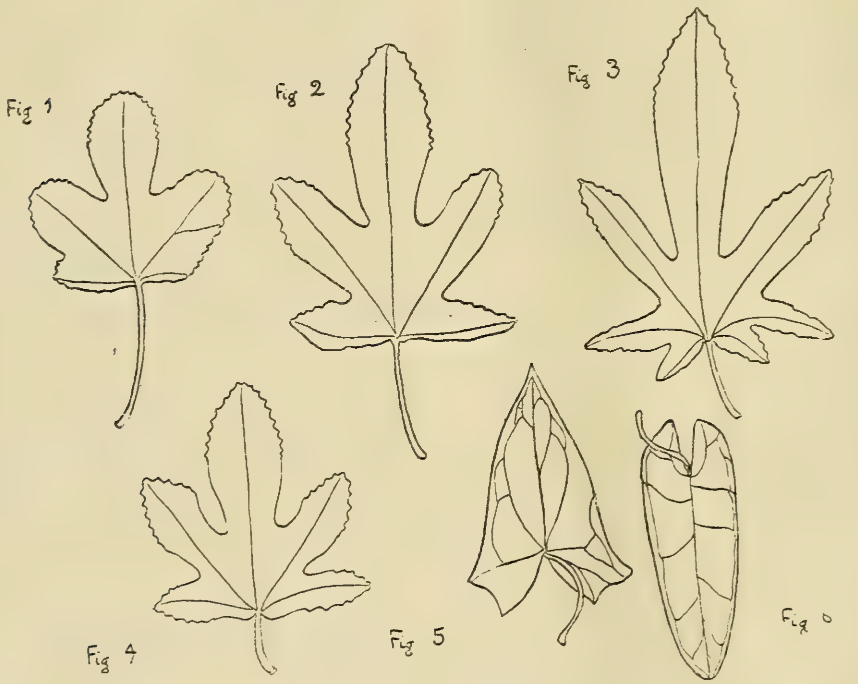
The capacity of the crop of the woodpigeon (*Columba palumbus*) is notable. One recently came to our notice that we venture to think is a record. It contained 197 maize and 163 grains of wheat—a total of 360 separate items.

# VARIATIONS OF THE LEAF-BLADE.

By H. E. Griset.

TO the botanist the important subject of the variation of the lamina, and the cause of this variation, will ever possess the highest interest, from its value in the determination of plants; and there is little doubt that warmth and moisture in the case of terrestrial plants favour the growth of the parenchymatous and vascular tissues, as Mr. J. A. Wheldon remarks in his notes in the October number, upon the article of the above heading. What can be the use of the dense epidermis and mostly entire or solid form of the leaves of many succulent plants? Is it not to protect the more delicate parenchyma, which in membranous and divided leaves would obviously be rapidly deprived of moisture in the dry atmosphere of the habitats of these plants?

In studying the forms of the leaves of the same species we are generally led to the conclusion that the largest and most divided leaves are produced in the most favourable time of the year, which, of course, varies with the species. This is well illustrated: if the minute differences in the leaves of the fig-tree (1) (*Ficus carica*) are carefully noted for one whole season; it will generally be found that the leaves become larger as the warm weather advances. Thus on a single shoot about nine inches long, on May 1st, a leaf was mature, it was simply three-lobed, the casta of the median lobe being 10 centimetres long (10 centimetres, or 1 decimetre = 3·93708 inches), (fig. 1) (2). On June 2nd, four more leaves had been formed, the fifth being deeply five-lobed with a median costal length of 15 centimetres (fig. 2); and on June 18th, three more leaves were matured, the eighth being seven-lobed, with a median costa of 16·8 centimetres (fig. 3). Of course the other leaves formed the gradations between those cited to show the striking difference in size and division: the shoot had, in the meanwhile, lengthened to sixteen inches on eight additional nodes. In the autumn, the newly-formed leaves again become smaller, stouter, five-lobed and less divided, as seen in the typical form at this period, represented at fig. 4,




Variations of the Leaf-blade.

Figs. 1-4, leaves of the fig-tree, *Ficus carica*; figs. 5, 6, leaves of the great bindweed, *Convolvulus sepium*.

(1) This tree, which grew on a garden wall facing the west, produced a shoot on the trunk which grew thirty-three inches in twenty-two days (from June 10th to July 2nd), which is a daily average growth of 1·5 inches.

(2) All my drawings are from the actual objects and correct to scale.

which is the commonly-received idea of the form of the leaf of this tree.

We can conclude from this instance that the warmth and dampness of midsummer in this tree favours the rapid formation of the tissues, the fibro-vascular bundles exceeding in length that of the parenchyma in breadth; for as the apex or extremity of a leaf is formed first, which is clearly decided by its withering invariably before any other part, as seen in the leaves of the tobacco plant (*Nicotiana tabacum*, Linn.) etc., the rapid lengthening of the mid-rib will produce a broader or narrower leaf accordingly as the parenchyma on either side is formed more or less quickly. Here, only a simple leaf is adduced, but precisely the same thing happens in a multicostate or quinque-costate leaf like that of the common fig-tree, which under these circumstances would become more or less divided.

Want of light decreases the number of chlorophyll corpuscules, consequently the quantity of assimilated matter, and therefore the formation of parenchyma, etc.; this helps to explain the sub-division of the leaves of *Solanum dulcamara* growing in shady places, like the leaf figured on page 61, *ante* (the third pair of lobes are scarcely seen in the figure), and also the rudimentary state of the lamina of plants growing in the dark. That total submersion in the case of aquatic plants tends to sub-divide or narrow the leaves, is seen in *Vallisneria spiralis*, *Ceratophyllum demersum*, several *Potamogeton* and *Utricularia*, and the submerged leaves of *Callitriche verna*, the floating rosette of the latter, which acts as a peltate leaf in sustaining the weight of the plant, are aborate oblong and become narrower as we descend on the stem, until the ultimate leaves have become linear with notched apices like those of *Vallisneria*.

There is no doubt that the round entire form of the floating leaves of many aquatic plants are floats to buoy the plant to the surface of the water, such as those of several species of *Nymphæa*, *Nuphar luteum*, *Brasenia peltata* (water-shield of North America), *Limnanthemum nymphœoides*, *Hydrocharis morsus-ranæ*, several *Lemnæ*, *Potamogeton natans*, (which has sub-eliptic or ovate lanceolate floating, and similar but narrower submerged leaves), *Nelumbium*, *Ranunculus aquatilis*, etc. Great variation in size and form is found in the peculiar angular leaves of *Atriplex patula* and *Solanum nigrum*; and the leaves of the great bindweed (*Convolvulus sepium*) vary from the normal broadly hastate form (fig. 5), with angular basal lobes, to a longer and narrower hastate or sub-lanceolate sub-cordate contour (fig. 6); numerous plants with the latter form of leaf I found on a shady hedge bank near Willesden. There also is a great difference in the leaves of the wood anemones growing in dry copses, etc., and those of damper habitats; in the former the leaves are much more divided, hairy, compact, deeper green and purplish, while the latter one is much more delicate, with lanceolate few-toothed and but little-cut segments. It is only by the application of the microscope and the united observations of botanists that this complicated subject will be explained.

*3, Cathcart Hill, Junction Road, London, N.; October, 1896.*

## STONE-CUTTING IN BORROWDALE.

By Dr. P. Q. Keegan.

SPEAKING generally and with strict reference to microscopic technique, the volcanic rocks of the Borrowdale series in the Lake District may be regarded: (1) as rather soft, mostly ash and slate; (2) moderately hard; and (3) very hard, mostly lava; though some of the altered ashes are hard enough. It is with the first class that we have here chiefly to deal, and for obvious reasons. If we desire to obtain a fresh specimen of a rock, the best plan is to collect it from a quarry; as most of the specimens, especially thin pieces, lying loose on the mountain sides are more or less decomposed or lichen-eaten, and will inevitably prove worthless for microscopic purposes. Having selected a piece of slate, or, not too tough a bit of ash, say about one inch square and as thin as possible, provided it is sound, the first business is to grind it flat on one side. This is done by means of rasp and file. I have two rasps about seven inches and five inches long by half-inch to three-quarter inch broad; also a series of small files, coarse and fine. The dust raised in the process is considerable, but this nuisance can be avoided by wetting the rock and files with water, which, however, makes a mess even dirtier than before. Nevertheless, we must go on until one side of the rock is tolerably flat, when we may relinquish the files, and proceed forthwith to smooth the face so flattened. Some fine emery powder must be placed on a flat piece of metal, the under side of a rectangular tin tobacco-box will suit, and having moistened it with water, lay the flat side of the rock down and rub very hard with a circular motion of the arm. This done, perform the same action with the section on a piece of plate-glass, using washed emery this time. Lastly, give the finishing touch on a hone and a leather strop dusted with putty powder. Having well washed the specimen free from all particles of grinding

powder, see that it has now a lustrous aspect, and the crystals of which it is composed are much better observed than before. Now take a glass slip and, having warmed it, put on some Canada balsam and heat all over a spirit-lamp, spreading out the balsam carefully so that it shall occupy a space on the slip fully equal to the area of the piece of rock. Do not heat the balsam to too high a point, or too long. When it has cooled somewhat, place the flat side of the specimen on it and move it about so as to displace all air bubbles between it and the slip. When all is quite cold, proceed to grind the rough upper side of the section in pretty much the same way as has been described. Rasp, coarse and fine file, emery powder coarse and fine, putty powder very fine, such is the order of procedure. As the operation continues, by holding the slide up to the light, some of the altered felspar crystals will first get transparent, it being nearly possible to see through them; but do not feel too elated, as the work is not quite finished. In point of fact, the most delicate and difficult part of the whole process is to decide definitely when it is thin enough or otherwise. The best finish is a rub on a fine hone moistened with paraffin. A good general rule is, that the section is thin enough when, on moistening it with water, ordinary printed letterpress can be distinguished through it. This maxim holds good in all cases, except where the presence of much oxide of iron or other invincibly opaque mineral occupies a very large area of the section. However, we will suppose that the operation on the whole has been neatly and completely done, and that we are bursting with impatience to see what there is under the microscope. The finish and mounting must be carefully manipulated. Take a large camel-hair brush with some clean water, and persistently clean away from the slide every particle of dirt or dust; then dry it and do the same again, using benzene or xylol this time, so that everything may be clear of extraneous particles. Be extremely careful not to put turpentine or any other essential oil on the section, and do not mount it in balsam. The best mounting medium for rocks that I know is a solution of gum-dammar in xylol.

Supposing that a satisfactory mount has been accomplished, we can now, with microscopic help, endeavour to observe the structure and constituents of the rock. A wide-angled half-inch objective is very serviceable for this purpose, and let us therefore use it to view a section of a moderately fine specimen of a rock which, according to a Fellow of the Geological Society, "affords abundant evidence in its structure and composition that it was derived from a similar source and in a similar manner to the beds of recently-formed volcanic ejectamenta which may be seen surrounding the cone of an active volcano." The difference, however, in the case before us is, that the rock, as old as the Silurian age, has been considerably metamorphosed by time and environment, by heat, pressure and aqueous agencies. Hence, instead of seeing fresh, clear and well-formed crystals of felspar, augite, etc., we see now only turbid ones deformed and broken, and internally quite changed into other and different minerals. Two principal objects are observed in the section under review. First, there are a large number of whitish turbid forms of an approximately crystal shape: these were originally clear felspar prisms, but are now deformed and broken, with their edges more or less ill-defined or irregularly rounded, their relative hardness and infusibility, however, preserving them from total destruction, notwithstanding that metamorphic agencies have transmuted them internally into calcite and mica flakes, chlorite and quartz. Along with these there are a much smaller number of clear chlorite crystals which were originally augite, probably black and opaque. Secondly, these larger constituents are embedded in a powdery "base" which is much more injured and disordered than they, it being very cloudy and composed of a semi-opaque heterogeneous powder interspersed with patches of green chlorite, dark brown oxides of iron, etc. This base represents the fine dust which resulted from the destruction by volcanic explosion of the softer minerals, such as augite, enstatite, garnet, magnetite, glassy residuum, etc., of which the original lava was composed; and "we may look upon it that the original andesitic and other volcanic dust of the rock has decomposed in such manner that the augite, etc., gave rise to chlorite with garnet, while the felspathic part of the mixture was largely altered to mica." (Hutchins.)

*Patterdale, near Penrith.*

Bats and Music.—On more than one occasion I have drawn attention in these pages to the influence of man's civilization on wild animals. For the past month I have noticed that a common species of the small bat, probably the pipistelle, which frequents the towns in Southern France, congregates in the evenings about those cafés where it is the custom to have outdoor music. This does not seem to apply to any particular town, as they are to be seen flitting about in the crowded streets amongst all the traffic in Marseilles, Cannes, Nice and Monte Carlo. So tame are some individuals that they hawk about for flies under the awning which covers the chairs placed on the footpaths. It may be said they come for the flies attracted by the electric lights, but the bats are far more numerous near those cafés where there is music than around the ordinary arc-lights in streets or before shops. The inference appears to be that they find pleasure in the presence of music.—*John T. Carrington, Beaulieu, Alpes Maritimes; Nov. 21st, 1896.*

## SCIENCE A MONOPOLY.

WE have received the following communication from a gentleman well known amongst leading geologists, and though we do not hold ourselves responsible for his opinions, we largely endorse his views, and think they will interest many of our readers who look on with amusement at the assertiveness of some of our neighbours. Our correspondent writes:

"'Botanical Opportunity' is the title of Professor Wm. Trelease's presidential address delivered to the Botanical Society of America, and reported in full in the September number of the 'Botanical Gazette.' As the president addresses himself to the large and growing number of young botanists who are seeking help and inspiration, and as his remarks will apply almost equally well to other branches of science, it may be worth while to call the attention of your readers to some of them; for instance: 'The present is a period of transition. A generation ago it was possible to accumulate wealth in commerce and also to devote much time to the study of nature. To-day the man who is not entirely a business man is better out of business, and, with a few exceptions, the man who is not entirely a student is little better than a dilettante in science.' The above is the opening paragraph in the December number of 'Natural Science.' It is, I think, a matter of congratulation that the address was delivered in America and not in this country, and it is a great surprise to me that the Editor of 'Natural Science' should have endorsed these views. It is practically a notice to quit. All the students of nature who work at their favourite science for the love of it and not as a means of obtaining bread and butter, are plainly told that their work is useless and their time wasted, and that the sooner they leave the field clear for the paid officials the better it will be for everyone concerned. We shall then have no more 'Preliminary notices,' no withdrawn papers on the 'Protoconch,' and the circulation of 'Natural Science' will be under three figures. It certainly seems curious that at the very time this periodical is appealing for more subscribers that the Editor should deliberately go out of his way thus to speak disparagingly of the majority of his supporters.

"Imagine my surprise, when turning to the first Paper in the same number of 'Natural Science,' to find that in a list of specialists for the determination of fossils were the names of several men who were not 'all science.' This is indeed sad, and we hope that when the Supplement is published, these names will be erased and those of 'professionals' substituted. Later on we came across the name of Darwin, who was a decided 'amateur,' and, therefore, was only a dilettante; but it is quite possible he was one of the few exceptions. Of course it is also quite possible that the American Professor was speaking of 'amateurs' of his own country; but this is quite certain, that the majority of the 'amateurs' on this side of the Atlantic would be ashamed to affix their names to many of the Papers published by some American 'professionals.' 'Natural Science,' I believe, appeals to South Kensington; but I am positive that the Editor's remarks will not be accepted by many of his supporters, most of whom have on various occasions expressed their thanks for help received from 'amateurs.' For a true estimate of 'amateur' work, I will conclude by quoting the words of a greater authority than even Professor Trelease, or the Editor of 'Natural Science.' I refer to the late Professor Huxley, who, in an address given to the Quekett Microscopical Club, said: 'Whoever becomes a man of science by profession, must know something pretty thoroughly; and this means that he must not only know pretty accurately this or that piece of detailed work: he must have not only the knowledge of general facts, but must possess the special knowledge also, and be able to guide the one by the other, and to criticise his speculations by his knowledge of detail—this is the only title by which he can sustain his claim. If he wishes to work out any scientific points with accuracy and detail, it must be a very small matter which does not occupy him for months, and need his closest attention during which time he will be drifting altogether away from the stream of progress of scientific knowledge. But you members of this Club (amateurs) are in this respect vastly better off, because you can give your attention to any one point which you want to get at the bottom of, and you are not likely to be pulled up by some student in the lecture-room, who has read the latest thing published, and who expresses surprise that you do not know all about it too. Consequently, you can give your attention to your own subject as exclusively as you may desire. I do not mean to say that you do not lose anything, for naturally where you have to deal with the deeper problems you will never come to any good, unless you have those principles to guide you. For three-fourths of the problems of microscopy, although you will require neatness and skill, clearness of eye and lightness of hand for cutting and preparing sections, the great amount of general knowledge which a man of science is required to have is of no consequence at all. Several amongst your number have asked me to indicate those courses of enquiry which may best be com-

mended to members of such a society as this, and it strikes me that the suggestion which I have just made supplies the answer. It is exactly in that field—the following up of details, tracing out minutiæ of structure, in occupying themselves with such questions as are only to be solved by long and patient devotion of time and dexterity, and a thorough knowledge of instrumental manipulation —it is exactly there that men of science find their difficulties, because the amount of time consumed is so great.' Professor Huxley then pointed out that the life-history of most micro-organisms was unknown, and urged the members to endeavour to remedy this, and added that—'This is the kind of service which those members of the club may perform who feel inclined for it: it is work which may be of very great value, and which certainly cannot be undertaken by those who have to occupy themselves with science as a whole.'"

## THE CHANNEL ISLANDS.

By Alfred H. Bastin.

HAVING spent a very pleasant holiday last July in the Channel Islands, it has occurred to me that a few natural history notes I was able to make there, might prove acceptable to those who have never had an opportunity of visiting the Normandy archipelago. They may perhaps serve somewhat as a guide to others who may purpose going there. The islands are reached from England by way of Weymouth or Southampton, the latter being the longest sea trip, and the one to which the following remarks refer.

Let us then imagine ourselves on the deck of the South-Western Railway boat, feeling the throb of the engines beneath us, and, the fresh, salt sea-breezes in our faces, steaming down the Solent past the Needles lighthouse. Then out into the Channel, where the white-crested billows soon cause the good ship to roll slowly from side to side, much to the discomfort of some of the passengers. If constitutional conditions permit, however, the deck is by far the better place. The air is glorious, and one does not soon tire of watching the dancing, sunlit waves. When these fail to interest, there are the gulls, following us mile after mile, soaring and circling above the masts, as rooks fly round the elm-tops at evening before going to rest. An occasional cormorant or shag flies swiftly past, close to the surface of the water, and ever and anon we run unexpectedly into a school of porpoises, which amuse everyone by their antics. All is of interest to a landsman, from the long, low steam cargo-boat, lazily rolling up Channel, to the white, sparkling foam, which flies from our bows as we forge ahead. When approaching the Islands, the Casquets, a group of very bare and bleak-looking rocks, are the first to appear above the horizon. Next comes Alderney, and shortly after our destination—Guernsey. At St. Peter-Port the quay is crowded with visitors and harbour officials, shouting porters and importunate cab and car proprietors, all mingling together amongst the heaps of fruit-baskets and the waiting conveyances. After a slight delay, the boat comes alongside the quay and we go ashore.

With regard to natural history—first, let the Guille Allés museum, situated in the French market, at St. Peter-Port, be mentioned. Here we may learn something of the local fauna; though this institute shares to a large extent the fault of so many local museums, viz., the hoarding of large numbers of badly-arranged curiosities, which take up much valuable room. The Lepidoptera, though small in numbers, are good. From them we learn that *Argynnis latona*, *Colias edusa*, and *C. hyale* are taken here; also, that there are only four of the genus *Lycæna* in the islands—*L. alexis*, *L. argiolus*, *L. agestis*, and *L. ægon*.

Fermain Bay, about two miles from St. Peter-Port, is an excellent bathing-place, providing the tide is not too high. Ascending the path from the beach, one is forcibly struck with the extreme clearness of the water here. Excepting on the coast of Cornwall, one seldom sees really clear sea-water in England. Looking over the edge of the cliff, we can distinctly see shoals of fish swimming far below, and the stones and weeds on the bottom, at a depth of many feet. Still ascending the path, we are continually dislodging specimens of the currant-moth (*Abraxas grossulariata*); no striking varieties appear, however, and we press onward. In all the open spaces the butterflies, *Epinephele tithonus* and *Satyrus semele*, in the hot sunshine, are flying by in hundreds from flower to flower. Some *E. janira* also appear, but not in such numbers. *Pieris rapæ* and *P. napi* are common enough as usual, but *P. brassicæ* seemed more scarce. Half-a-mile farther on we come upon numbers of *Bombyx quercus*, many of which are flying up, down, and across our path. Here, too, we find *Lycæna alexis* and *Polyommatus phlæas* in some numbers. At Cobo Bay, on the other side of the island, the dry rushes and plants growing on the tracts of land above high-water mark are literally incrusted with shells of *Helix virgata* and *Bulimus acutus*.

There must have been millions of specimens. The same thing was remarked at St. Owen's Bay, in Jersey, though in that case the shells were not in quite such vast numbers. Some good forms were collected from both localities. *Helix aspera* and *H. nemoralis* are common in both Jersey and Guernsey, but *H. hortensis*, though undoubtedly occurring, was not noticed.

A boat leaves St. Peter-Port two or three times a week for Herm. This island is well worth a visit, from a naturalist's point of view, from the fact that there, at the north end of the island, may be seen a most curious phenomenon, the "shell beach." This beach extends perhaps one hundred yards or more along the sea front, and is composed of innumerable quantities of dead shells, both broken and perfect, mixed with fine shingle. It is as though the whole of the molluscs, from near all the islands congregate off this strip of beach when they feel their end approaching, just as the guanacos of South America are known to have special "dying-places." This shell beach becomes even more curious and interesting when one learns by experience how very few dead shells are to be found on the shores of the other islands. One of the most numerous species on this beach—and from its shape the most perfect—is *Cypræa europæa*. With a little careful searching a good series of this shell, fit for any cabinet, may be obtained. Other genera are represented in large numbers, such as *Rissoa*, *Phassianella*, *Erata*, *Trochus*, *Emarginula*, *Fissurella*, *Dentalium*, *Patella*, *Littorina*, *Mangelia*, *Nassa*, and very many others which space forbids me to enumerate.

Sark is well worth a visit for the sake of its beauty, if for no other reason. Here one late *Euchelia jacobæ* was taken, and hundreds of the larvæ of that species were noticed, in all stages, feeding on the ragwort. One or two *Lycæna agestis* turned up, and *L. alexis*, while the three "browns" before mentioned were flying all over the place. Here was a good clover-field, which we watched carefully for *Colias edusa* and *C. hyale*.

## BRITISH FRUITS.

By David S. Fish.

Most persons who have been so fortunate as to visit the East or the South, with their wonders in vegetable and animal life, have nearly always remarked on the number and variety of the tropical and sub-tropical fruits. They say, and truly, that Britain has very few native fruits, compared with those favoured regions. As a matter of fact we have very few fruits which, as found in our woods and hedges, are worth eating. Some believe we have none which are native, and that the Romans introduced all our best wild fruits. Whether they did or did not, our shrubs which bear fruit may now, in most cases, be accounted native.

We have about five native fruits which are popular to country dwellers. They are the wild forms of raspberry, gooseberry, strawberry, blackberry and dewberry, which are fairly good before cultivation. The best is the blackberry (*Rubus fruiticosus*), of which we have about forty sub-species, which offer a wide range of sorts to hybridise or cultivate.

The renowned "American" varieties are nearly all from selected plants found growing wild, and we might easily improve our own stock. The fruits I have mentioned and a few more found on mountains, such as the cloudberry (*Rubus chamæmorus*), are all that nature has given for our use in a fairly good state of perfection, but they require the help of man to attain their highest quality. Our gardens would indeed have been very poor in fruits were it not for the apple, pear, plum, raspberry, red and black currants, and cherry, which we owe respectively to the original *Pyrus malus*, *Pyrus communis*, *Prunus domestica*, *Ribes rubrum* and *R. nigrum*, and *Cerasus sylvestris* or *Cerasus vulgaris*.

The economy of nature is well shown in the degrees of perfection in which we find the fruits of various climes. In tropical lands where the heat is so intense that little work or culture of the land may be carried on, and where animal food must be eaten very sparingly, other food is found already provided in the shape of rice, bananas, plantains, and the many other fruits and vegetables with which those lands teem. As we go further north the fruits are not so perfect in their wild forms, but as the climate is cooler and more bracing, man is enabled to cultivate them so as to reach their maximum quality: first by growing for some generations in a soil rich in substances which are specially favourable to free growth and gradual improvement of the species; secondly by hybridising, with the object of combining the good and leaving out the bad or faulty qualities of both parents; thus we attain the greatest possible amount of flavour, prolificness, and size of fruit; and thirdly by sports which are freaks from the ordinary form, usually caused by special circumstances or elements contained in the soil.

Some fruits change as the plants grow older, as in the case of the barberry (*Berberis vulgaris*), the

fruits of which on old plants lose their seeds and thus gain in quality. The barberry is also peculiar from the fact that the bushes, after growing some years very freely, stop all at once, and hardly increase at all in size after this stage, though still throwing up suckers.

As perfection of a fruit rises higher and higher, it generally results in an increase of the fleshy part of the fruit, or drupe, and a decrease in the stone or seed. This is well shown in the plum, apple and pear. These fruits are nearly all seed when wild, with little of the flesh or edible part; but under cultivation the reverse is the case. Cultivation results also in a decrease of spines, thorns and prickles; for instance, the gooseberry, when wild in the woods, is covered with spines. It gradually loses them when artificially grown, and only recently a French nurseryman announced a spineless variety. Two other curious freaks are worth mentioning as the result of cultivation. These are a white "blackberry" and a white or yellow "black currant." Literally these names have no sense, but when anyone speaks of a blackberry it brings up to our mind's eye something more than a berry of a black colour—we can see the shape, outline, form and arrangement of the drupels, but of different colours. Thus, a "white blackberry" is far more descriptive to us than "whiteberry" would be.

There are several of our wild fruits which might be taken in hand and improved. Some grow on the highest mountains, and would need a gentle and patient hand to make them feel at home at a lower level. Most of our wayside berries are edible; and if not palatable to us, they are to the feathered tribe.

*12, Fettes Row, Edinburgh.*

## NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

IN my last notes, page 159, I described some anemones I found at Swanage on August 15th. I returned to Shiplake on October 1st. Being loth to leave my anemones behind, I determined to take them home, and write for the artificial sea-salt recommended by Mr. Reginald Bennett, in his "Marine Aquarium," A good deal of the water placed with the anemones was spilt on the way, so that on reaching home they had to be placed in three finger-glasses with a little seaweed and a small amount of sea-water. I wrote to one naturalist's shop after another to obtain "Southwell's Aquarium Sea-salt," but was unable to obtain either that or the specific-gravity bulbs mentioned on page 20, in Mr. Bennett's book, "The Marine Aquarium." The anemones were fed with meat, but soon seemed to fail; the water became malodorous, and I was in despair; so on October 25th I threw one lot of anemones and periwinkles away. The anemones had decreased terribly in size, were covered with a thick black slough, and many appeared inanimate altogether. It was a deplorable spectacle. Before emptying the next lot I thought I would give the poor brutes another chance, with kitchen-salt and river-water. Hastening indoors I suddenly thought that in 1892 my husband had bought, at Southwold, in Suffolk, some bath-salt from the salt-works. I went to his cupboard to see if he had any left, and found some packets. I took one calculated for a three-gallon bath, and emptied it into a can of hot water. When cool (being very salt) I mixed some river-water with it till it tasted like ordinary sea-water; I then emptied the anemones out, cleaned their glasses, and replaced them in this mixture: they immediately began sloughing their black fetid skins. I assisted to remove them with a camel-hair brush, The next day, October 26th, I found them much cleaner, and administered some raw mutton. On the 27th they had plumped wonderfully, the meat was sucked white, and one brown anemone emitted five small brown ones, which, whilst I was looking, fastened on to a piece of the sucked meat. For a day or two meat was given every other day. On November 1st, I gave them fresh water, all were alive, some grown to their original size, others still small but healthy. The original seaweed was so bad it had to be dispensed with; I therefore wrote to a young fisherman at Swanage, and told him to send me some four or five stones with seaweed growing on, viz., sea-grass, *Enteromorpha compressa*, and green laver, or *Porphyra vulgaris*, and also to fill up the cigar-box I sent with seaweed unwashed from the shore, and, if he found them, some anemones and periwinkles. He did as I asked, but only sent one anemone, a green one with blue eye-spots, and the periwinkles were mostly empty shells. I rearranged the anemones, some in a new white enamel-lined pie-dish, which seems to suit them admirably. On November 14th some brown anemones were born, one red old anemone seems to be producing one by gemmation at the side. This I am watching. I occasionally add a little water, mainly from the river, to counteract the extra saline which the water develops. Will anyone tell me where the articles Mr. Bennett mentions are to be obtained?

*Shiplake; November, 1896.*

# THE RING OUSEL.

By Robert Godfrey.

IN the thrush family, the ring ousel, *Turdus torquatus*, is the only strictly summer visitor to the British Islands. In exceptional cases, solitary individuals remain over the winter, but though such wintering birds have been found in Scotland, none to my knowledge have occurred in the Forth area. With us the bird does not put in an appearance till the end of March, and he makes at once for his ancient haunts by the rugged streams and waterfalls. He is one of the many birds that enliven the solitudes when the heather is again springing up afresh to renew its grandeur. The ring ousel chooses for his home the desolate hills with their many tumbling burns, and the stony screes that lie exposed on the steep hillsides. At the time of their arrival they are very noisy and musical, and by their continual clamouring, afford the observer a much better opportunity of estimating their numbers than they do later in the season. Though occurring by the larger streams commonly enough, they have a decided preference for the smallest and narrowest burns, and for those especially with steep and rocky sides, and as they fly up and down the streams, awakening rudely the still slumbering hills with their harsh notes, they seem to be displaying unbounded energy in their delight at reaching their nesting-haunts once more. It is somewhat difficult to dissociate the ring ousel from water, seeing that the stony hill-slopes and rock-faces which he so loves to haunt are generally close to some trickling stream or other, but in districts where the valleys are wider and the hills higher than in the Pentlands, and where the birds are found most commonly on the stony tracts on the mountain sides, the adjunct of water to the ring ousel's haunts is seen to be, in many cases, merely a casual detail.

This bird is brought most prominently into notice during the months of April and May, when his noisy calling and bold singing force him before our gaze. His call-note is a harsh "chack-chack-chack-chack," and his song is a loud, bold, clear production, often repeated, but presenting very little variation. It may be rendered as "tyu-wee" or "kee-weep," many times repeated. In the wild uplands of Dumfries I have heard the bird singing as early as 3.46 a.m. on April 16th, which is earlier than I have noted the blackbird's song on the lowlands at a corresponding date. Sometimes he sings from a leafless tree, but generally he is perched on a stone or other simple post on the hillside. Besides these main cries of the ring ousel, I have noted a repeated cry, somewhat like a blackbird's, uttered when the bird is suddenly roused, and another different cry when young are being fed.

In his actions on the ground the ring ousel resembles a typical thrush, and is, if anything, more active than our other common species. He stands proudly erect, with his tail touching the ground, and displays, to full advantage, the pure white crescent on his breast. After a short halt, he sets off in his search for food, flirting his wings as he starts off, and proceeds, by short stages, over the uneven surface of heather, darting quickly at such scraps as lie in his way. This movement is a combination of running and hopping, and when in motion he lowers his head and raises his tail clear of the ground, and maintains this attitude even after halting, until he has picked up some morsel of food, when he at once assumes his erect posture. When disturbed, he flies off, with harsh calling, to a good outpost, and sometimes jerks up his tail like a blackbird. The flight of the ring ousel is performed with rapid wing-beat and regular break, and has a fluttering appearance owing to the lightness of the inner webs of the expanded primaries.

During the latter half of April the birds may be seen hopping in and out amongst the heather, looking for a suitable nesting-hole, and before the end of the month they have not only chosen the site, but have in some cases already laid. Such nests as I have found on the Pentlands and on the Lammermuirs have been near water, generally on the banks of the small tributary streams that flow down side ravines to a main valley. Often the nest is placed on a rocky ledge with or without a protecting heather-tuft over it, sometimes it is snugly concealed amongst long heather not far from the stream, and less often it is placed on the low grassy bank of a less romantic burn. The ring ousel is partial to certain stretches of the streams during the nesting-season, and selects year after year the same rocky face or the same heather-clad slope for its nest; this is very noticeable in some cases, but is, of course, far from being the rule, there being so many subsidiary purposes at work to prevent its being continually carried out. When the nest is built on the soft bank of a stream, a suitable cavity is first formed by the bird, and the nest itself has a very thick muddy bottom, but when a ledge of rock is chosen as the site, such a foundation is not necessary and the amount of mud is much less. The nest is formed externally of pieces of bracken, sedge, moss, and rough grass, held together by mud; the rim consists of small root-tufts of grass with pieces of heather and bracken, and the lining consists of fine dry hay—not so fine, how-

ever, as in the case of the missel-thrush. I have found the measurements, in a perfectly new nest, to be, inside diameter 4½ inches across by 2⅝ inches deep, and those of a nest containing incubated eggs, and found the same day, 4 by 1⅝ inches. In position, the nest is quite firm and strong; but such nests as have been built in hollows formed by the birds cannot be removed without the bottom portions crumbling off; a specimen for a collection must be taken from a ledge. The normal clutch of eggs is four, laid at the beginning of May; in one instance, I found a bird sitting on three. I have seen unfledged young in the nest as late as June 30th; but have no positive information of a second brood being reared in the same season. The eggs are bluish-green in ground colour, and are spotted or blotched with brown of varying shades. They are generally much more boldly marked than blackbirds'. Addled eggs are left in the nest. The ring ousel betrays little excitement when the nest contains fresh eggs, uttering a single cry perhaps as she flies off, and remaining silent thereafter; but as incubation proceeds, she becomes more and more demonstrative, and flies in wild excitement about the banks of the stream during our presence. Should she fly off without being seen, she maintains an almost complete silence until the intruder discovers her secret, and then displays her alarm. The actions at the nest, however, may be best described by our choosing a particular case.

We have reached the side of a large stream on the Lammermuirs, and turn aside to a tributary water, whose banks are heather-clad and adorned with junipers; at parts are naked scaurs by the water-side, and our dreams run high of all the rare mountain dwellers that these places may attract. Presently a ring ousel moves along the bank by short flights and disappears in a spot likely enough to contain the nest, but she leaves again in restless manner and flies off. We retreat a little to take a clear view of the supposed haunt, and lie down to wait. "Chack-chack," again the ousel comes; she is at present perched on a grassy slope a little down stream. Slowly she advances towards the scaur, quivering her wings and tail very frequently as she goes, and at every halt uttering her bold call-note. Now she moves along the heathery top of a small scaur, enters a hole beneath the heather, emerges again and flies to a streak in the scaur like a sheep-run; along this the bird hops and runs until she reaches at length the same bank in which she had previously disappeared. Still calling "chack-chack," she flirts her wings from her perch, descends the slope a little, halts on a patch of grass, then flies to a tuft of heather and at her next move silently passes into a hole and is at rest. We have her secret now, and on rising, cause her to leave her nest. Flying down stream and up the hillside, she alights on a burnt stump, from which she will be able, no doubt, to follow our actions, and again she calls. We cross the stream, and mounting to the spot near the top of the scaur, find the nest on a small shelf secreted behind a tuft of heather. The bird flies towards us, and watching at first from a low tree, comes excitedly to us, calling as before, and flirting her wings repeatedly from her perch on the heather-tufts; she beats backward and forward beside us, constantly calling, and when we retire to the stream-side she descends to a level with her nest, and hops about the scaur "chacking," and flitting in the greatest excitement about the spot where her nest was, whilst her mate passes along the hill-brow but does not come down to join her.

The young birds continue to be fed by their parents after they have left the nest, and on one occasion we were much interested in watching a male ring ousel so engaged. Our attention was attracted to him as he kept flying about a hillside, and after following him for a little we were soon able to locate the position of the young. He procured the food on a level stretch of pasture near the stream, and, flying with it to the slope, ascended the heather-face by short stages, approaching in a carefully circuitous manner the large heather-clump under which the young were safely hidden, and suddenly disappeared beneath the heather. The crowing noise explained what was taking place, and after feeding them the old bird rose suddenly through a gap in the heather again and perched on its top for a moment, with his breast towards us, and the gorgeous white crescent thereon distinctly marked against the dark surroundings. Only occasionally did he call "chack-chack" and flirt his wings, whilst his mate, less black in hue, would answer from an adjoining fence-top; but during the feeding another cry, "zree-zree," was repeatedly uttered, perhaps by the young. After careful watching we crossed the burn and found the young resting merely on the ground beneath the heather, and heard them as they flew off utter the bold call-note of the adult; they were well able to fly, and made for another sheltering tuft further up the hill.

The birds linger in their mountain haunts till September, being sometimes seen in companies during the first half of the month, and departing about the middle of the month.

*46, Cumberland Street, Edinburgh;*
*December 3rd*, 1896.

Astronomers, we regret to observe, have lost two of their leaders. Monsieur Felix Tisserand's death was followed, within a month, by that of Herr Hugo Gylden, at Stockholm, on the 9th of November last. The latter had charge of the Stockholm Observatory from 1871.

# THE "PRINCESS ALICE" MARINE RESEARCHES.

PRINCE Albert of Monaco, whose deep-sea dredgings and other investigations into marine zoology and botany are so well-known, recently described his third voyage in his specially constructed vessel, the "Princess Alice," before the Academy of Sciences of Paris. This voyage, however, is the seventh the Prince has undertaken at his own expense in the cause of science. His Serene Highness left Monaco about the end of May last, and the voyage lasted until the end of August, comprising two expeditions, the first in the Mediterranean and the other in the Atlantic. In the Mediterranean the Prince devoted his attention to the capture of large Cetaceans, which have never been properly studied in that sea. For this purpose he engaged a master whaler from Scotland and proper means for capturing these large marine animals. Among the specimens secured were a *Grampus griscus*, ten and a-half feet long, and two examples of the *Orca gladiator*, one of which reached nineteen feet in length. A whale measuring sixty feet was harpooned and lost. This whale was afterwards found dead in the Gulf of Genoa, and the skeleton has since been offered to the Prince by the Italian Government.

In the Atlantic, the Prince surveyed and charted a bank extending about 150 miles in diameter about 350 feet below the surface. The principal interest in this expedition centred in the use of entirely new types of fishing-gear hitherto insufficiently tested in deep waters, such as trellis nets, which are generally used on the Mediterranean littoral, but at a depth not exceeding 100 feet. These have been lowered to 8,000 feet; from those regions the nets in the three first trials produced very interesting and rare species of fish. By using very long lines bearing a hundred or more hooks, lowered as deep as 5,150 feet, other fish of equal interest and which have not occurred in preceding expeditions were obtained. Trials with thirty-four dredges and "eel-traps" around the Azores, about 300 miles from the Portuguese coast, at a depth of 15,000 feet, have given rich results, notably at 4,500 feet, in varied specimens of crustaceans and fish. From 12,000 feet to 15,000 feet produced many specimens of Echiderm; one "trap" left for forty-eight hours on a bottom 4,080 feet deep brought up 225 fish and sixty-four enormous crabs.

In the neighbourhood of the Azores the expedition captured seventeen turtles; some weighing as much as seventy pounds each were captured and studied. One was set at liberty with a brass medal attached indicating the name of the ship, date, and spot where it was thrown back into the sea. It is unknown where these reptiles come from, or where they go; it is only known that they do not breed near the Azores. In his speech before the Academy the Prince mentioned a curious incident that occurred at the commencement of his voyage, while still in the Mediterranean.

On the 4th and 5th of June a hundred or so swallows invaded the ship, visiting the engine-rooms, stoke-holes, and laboratories. Eighty were counted as having spent the night on board, and the next morning they freely took food from the sailors' hands. There were also at the same time numbers of birds of other species which remained in the rigging during the day, but these were far less tame than the swallows.

The expedition included M. Neuville, the prosector and taxidermist to the Paris Museum, and Mlle. Le Roux as artist. These expeditions made by the Prince of Monaco are of great value, as contributing to a better knowledge of the Oceanic fauna and flora, being well conceived and admirably carried out with a large expenditure of money and care. In this case the results have borne great benefit to fishermen, who have made great hauls on the new bank discovered this year by His Serene Highness.

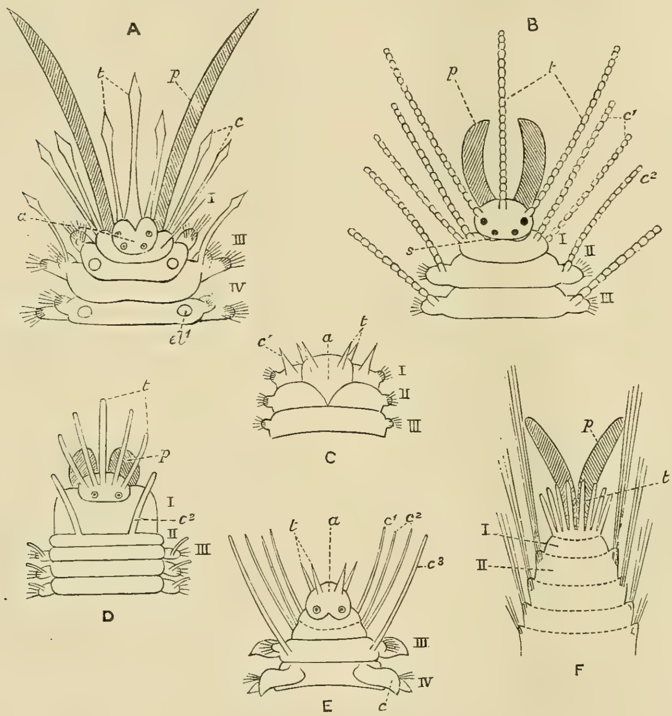
POPULAR NAMES OF BRITISH PLANTS.—In the "Transactions" of the Leicester Literary and Philosophical Society, Part vi., there is a paper by Mr. F. T. Mott, F.R.G.S., on this subject. He points out that the popular or English names for plants are very unstable. For instance, the flower once called forget-me-not is ground-pine (*Ajuga chamœpitys*); heart's-ease once meant the wall-flower, now it is the well-known pansy which goes by this charming designation. There seems to be no reasonable explanation of these curious changes, sometimes they are due to clerical blunders, and sometimes to a misunderstanding of obsolete or foreign words. Mr. Mott says that one of the most complicated name-pedigrees he has met with is that which Prior gives as the origin of the two names "yew" and "ivy." The two plants are not in any way similar. One is a gymnosperm and the other an angiosperm. Yet it is evident that their names are derived from the same source. They are both a corruption of the Latin "abiga," which was formerly written with a "u" or a "v." The abiga was a plant called by the Greeks "chamœpitys," and this in Italy "abiga," or the "black cypress." This black cypress was supposed to be the yew, hence the yew got the name "abiga" altered in manuscripts to "ajuga," "aiuga," "iua," and then into "yew." The Greek name "chamœpitys" was, however, by the early English writers understood to refer not to the black cypress but to a plant with a similar odour, the ground-pine, which also got the name "iua" from "abiga," anglicised in this case into "iva" and "ivy."

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*The Cambridge Natural History.* Edited by S. F. Harmer, M.A. and A. E. Shipley, M.A. Vol. ii. Worms, Rotifers and Polyzoa, by several authors. 560 pp. large 8vo, illustrated by 257 figures. (London and New York: Macmillan and Co., Limited, 1896.) 17s. net.

The new volume of "The Cambridge Natural History" just issued fully maintains the high character of the preceding volumes. It is the third of the series which has been issued. It deals with a group of animals which are little understood by ordinary readers, although some of the aquatic and terrestrial species have latterly commanded considerable attention. The pages of the book before us are divided into eight sections, which are: "Flatworms and Mesozoa," by F. W. Gamble, M.Sc.; "Memertines," by Miss L. Sheldon; "Thread-worms and Sagitta," by A. E Shipley, M.A.; "Rotifers," by Marcus Hartog, M.A.; "Polychaet Worms," by W. Blaxland Benham, D.Sc.; "Earthworms and Leeches," by F. E. Beddard, M.A.; "Gephyrea and Phoronis," by A. E. Shipley, M.A.; "Polyzoa," by S. F. Harmer, M.A. The monographs bring the knowledge of their respective subjects to synchronize with the latest researches. They are not intended to deal with the known species in each order, but treat generally with the cycle of existence of the groups and their various anatomical features. Though perhaps less attractive than some other volumes of the series, vol. ii. is by no means the least important, for it places at the disposal of students and general readers a mass of information which could not be readily attained without considerable research in somewhat scattered literature. Considering how comparatively little worked are some of these groups, the publication of this volume cannot fail to give an impetus to their investigation. Preceding the work is a "Scheme of the Classification" adopted in the book, in which our readers will find some alterations from the older works, but they naturally become inevitable with the advance of scientific investigation. We are pleased to note that, although dealing with technical details, the




Heads of various Polychaeta (Diagrammatic).

From "*The Cambridge Natural History*," Vol. ii.

A, Polynoid; B, Syllid; C, Nephtys; D, Eunice; E, Phyllodoce; F, Trophonia; *a*, prostomium; *c*, normal cirrus; $c^1$, peristomial cirri; $c^2$, cirrus of second segment; $c^3$, cirrus of third segment; $el^1$, point of attachment of elytron; *p*, palp; *s*, nuchal organ (ciliated pit); *t*, tentacle; I., peristomium; II., III., IV., segments.

literary style maintained is similar to that of the preceding volumes in the "Cambridge Natural History"; it is remarkable for its lucidity, and may be understood by quite beginners in the study of worms, leeches and their allies. The illustrations have been selected with the utmost care, and although sufficient for the purpose of indicating the meaning of the text, in no part of the work do they unnecessarily encumber its pages. By permission of the publishers, we have pleasure in reproducing a couple of figures as examples.

*The Story of the Chemical Elements.* By M. M. PATTISON MUIR, M.A. 189 pp. small 8vo, with two illustrations. (London: George Newnes, Limited, 1897.) Price 1s.

This is the last published of the "Library of Useful Stories," some of which we have previously had the pleasure of noticing. It deals in a popular manner with some of the commonest phenomena around us as produced by physical change in but few elements. The little book is well written, and cannot fail, like others of the series, to make many people wiser about some very common things.

*Gleanings from the Natural History of the Ancients.* By the Rev. M. G. WATKINS, M.A. 258 pp. 8vo. (London: Elliot Stock, 1896.) No price given.

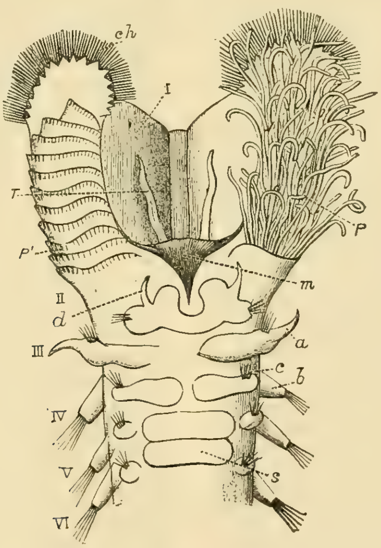
The euridite compiler of some quaint chapters, pleasant to read, has narrowly escaped spoiling an otherwise nice book by the affectation of introducing into the typography the old-fashioned letter "ſ" for our now familiar "s." When the modern reader finds pages of old-style with which he is not familiar, he soon tires of the reading. For instance: "All ſcholarly fiſhermen know that charming idyell of Auſonius on the Moſelle," is antique but apt to be irritating, and will surely deter many from proceeding with the investigation of the quaint legends and statements of early writers, as set forth by the Rev. Mr. Watkins. Most of the gleanings in this book are familiar to classical scholars, but they are none the worse for being re-told. Others there are, less commonly known, and the whole forms a pleasant series of chapters, marred only by the disappointing result of straining too far after the antique, which is likely to give those who read aloud an habitual lisp when reading "theſe ſemi-claſſical ſtudies."

*Exterior and Interior Photography.* By WILLIAM MILLS, F.R.M.S., 68 pp. royal 8vo, illustrated by 4 plates. (London: Dawbarn and Ward, Limited.) Price 3s. net.

This work will be fully appreciated by many photographers, especially amateurs, who may find within it numerous valuable suggestions, especially upon the difficult art of taking satisfactory pictures of indoor views. The illustration given of the Nave of York Minster is good, the lights and shadows being well blended. The view of an interior of a room is also satisfactory; far more so than the usual attempts to picture such difficult subjects.

*Diagramettes for use as Students' Notes and Sketches.* By W. H. KNIGHT. (London: Chapman and Hall.) Price 1s.

This is a series of diagrams with explanatory information upon hygienic subjects, ranging from a country cottage well to the evils of tight-lacing and badly-shaped boots. Much time and evident attention have been expended on these diagrams which cannot fail to impress many people with the necessity for attention to simple necessities for sustaining good health.




SABELLARIA ALVEOLATA, L. VENTRAL VIEW OF ANTERIOR REGION × 10.

From "*The Cambridge Natural History*," Vol. ii.

*a*, Notopodial cirrus; *b*, notopodium; *c*, neuropodium; *ch*, peristomial chaetæ; *d*, neuropodial cirrus; *m*, mouth; P, multifid palp (gill filaments); P[1], ridges after removal of gill filaments; *s*, ventral (tubiparous) gland-shield; T, tentacle; I., hood formed by peristomium; II. to VI., following segments.

# MICROSCOPY

Mediums for Mounting.—Twenty years ago, or thereabouts, when I was working at microscopy, a difficulty was experienced in finding a medium wherein certain objects, such, for instance, as palates of mollusca, would not be completely overpowered, as it were, with light; that is, were made so transparent that their proper form could not be distinguished when magnified. Canada balsam was then almost only used; and gum dammar, which made matters worse, was just beginning to come into fashion. The general law of microscope vision that "an object becomes more distinctly visible the more its refractive power differs from that of the medium in which it is mounted" was then, if not actually formulated, at least practically recognized by mounters, professional or otherwise. In most cases there was no other resource but to mount the object dry, which of all other means is at once the most difficult and the most unsatisfactory. Judge then of the delight which thrilled the microscopical worker when somebody in Belgium (I think it was Dr. Van Heurck) proposed the use of gum styrax as a mounting medium in connection more especially with diatoms. Its index of refraction when pure is 1·6 (Canada balsam is only 1·540), and that of the silica of diatoms, etc., is 1·43, so that the difference is pretty wide. The principal value and strength of styrax as a mounting medium consist, so I have always thought, in enabling objects to be mounted therein which previously had to be mounted dry. Thus palates of mollusca, scales of butterflies and moths, various anatomical and physiological objects could now be seen with a clearness and convenience never before attained. I never saw anything more approaching what might be termed micro-real vision than a piece of broad-leaved meadow-grass which had been prepared by macerating in water, alcohol and benzine, successively for some days; and then mounted in styrax and viewed with its epidermis carefully focussed under a French ½-inch objective of N.A. 0·64, the condenser used being the Abbe of N.A. 1·4 with the top lens removed and a piece of optically-worked blue glass placed beneath the diaphragm. Styrax is recommended also as a medium for wood sections, insects and the like; also for rendering visible the nucleus of vegetable cells previously stained with hæmotoxyn. I have found it exceedingly useful for displaying the bordered pits of coniferæ in radial section after staining in logwood; in fact, I know of no other medium which shows them as well. For some other objects, however, it is useless; for example, striated muscle. If you cannot mount muscle in glycerine, by all means use a mixture formed by dissolving "fiddlers' resin" in oil of bergamot, which is about the least refractive of all mounting media; this will enable you to see the striæ almost as well as in glycerine. A solution of fiddlers' resin in oil of juniper, filtered through cotton-wool stuffed loosely in the neck of a glass funnel, is an excellent medium for many purposes; it has a pasty flow which makes it work very pleasantly, keeps perfectly limpid, and gives very good definition. A considerable "puff" or a big "fillip" came over from the United States not long ago. A certain Dr. Edwards, of Newark, N.J., in a note to Science-Gossip, extolled the merits of GunThûs as a medium for diatoms, etc.—I have not as yet seen this article for sale in the catalogue of any London dealer, but I have seen it in those of two north-country dealers, as sold dissolved in bisulphide of carbon. Has any reader ever tried it? If so, let us know what is thought of it, for the benefit of science. Some twenty years ago a tough and hale out-door naturalist of the old school admonished me to beware of mounting in Canada balsam delicate spicules of organic carbonate of lime, such as are found in the Echinodermata. I have never forgotten the advice. Even some very delicate dermal plates of *Cucumaria drummondi*, which I mounted twenty years ago in dammar solution (not nearly so corrosively acid as Canada balsam) are just now beginning to go—the lime is gradually being eaten away, leaving, however, the pure organic matter of the same form and pattern as before, though of course much more transparent, being a warning that the ideal medium for mounting is still to be discovered. —*[Dr.] P. Q. Keegan, Patterdale, Westmoreland; September*, 1896.

Preparing Hydra for the Microscope.—To kill *Hydra* in an extended condition does not appear so easy as the text-books would lead one to expect. One biological authority states that it may be killed "in a fairly extended condition" by the slow addition of alcohol to the water containing it, but in my hands the results by this method have never been worth the trouble of permanent preservation, and bear but little resemblance to the living organism. Another microtomist writes that it is easily killed in an extended condition by running a drop of osmic acid under the cover-glass. This method also, after patient trial, failed to give me anything approaching a resemblance to life, though useful enough when only sections were wanted. A few weeks ago, having made a great haul of *Hydra* on a pond-hunting excursion, I decided to try a number of narcotizing agents in the hope of discovering one that would give me the animal in very nearly the extended state it assumes in life. Hydrochlorate of cocaine, so valuable with the *Hydrozoa* was useless, however cautiously applied, the *Hydra* gradually contracting as the narcotizing proceeded. Chloroform at first seemed promising, but when it had associated sufficiently with the water to reach the animals they rapidly commenced to retract. Chloral hydrate simply induced maceration, though giving fairly extended specimens. At last mono-bromide of camphor was cautiously applied to a specimen in an extreme state of extension, and with pleasure I noted that narcotization was being effected without the least contraction of the tentacles. When irritation failed to produce retraction the specimen was killed and fixed with osmic acid, and a perfect mount was obtained after several dozen failures with all kinds of re-agents. Mono-bromide of camphor is but sparingly soluble in water, and the first attempt made by adding a crystal to the water containing the *Hydra* was fruitless owing to the length of time the drug occupied in dissolving. A saturated solution, made by boiling crystals in a test-tube, is the best method of use, a little of the solution being added to the water containing the organisms to be narcotized.—*George T. Harris*, 33, *Lindore Road, Wandsworth*.


CONDUCTED BY FRANK C. DENNETT.

| | Jan. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 7 | 8.7 a.m. | 4.6 p.m. | 19.16 | 22° 18′ S. |
| | 17 | 8.0 | 4.21 | 19.59 | 20° 38′ |
| | 27 | 7.47 | 4.39 | 20.41 | 18° 19′ |
| | | *Rises.* | *Souths.* | *Sets.* | |
| *Moon* | 7 | 10.4 a.m. | 3.39 p.m. | 9.29 p.m. | |
| | 17 | 2.42 p.m. | 11.27 | 7.23 a.m. | |
| | 27 | 3.16 a.m. | 8.6 a.m. | 10.48 | |
| | | *Souths. h. m.* | *Semi Diameter.* | *Position at Noon. R.A. h.m.* | *Dec.* |
| *Mercury* | 7 | 1.27 p.m. | 3″ 5 | 20.37 | 19° 16′ S. |
| | 17 | 0.52 | 4″ 7 | 20.41 | 16° 7′ |
| | 27 | 11.26 a.m. | 5″ 0 | 19.54 | 17° 16′ |
| *Venus* | 7 | 3.4 p.m. | 8″ 5 | 22.13 | 12° 40′ S. |
| | 17 | 3.7 | 9″ 2 | 22.56 | 7° 53′ |
| | 27 | 3.8 | 10″ 0 | 23.36 | 2° 49′ |
| *Mars* | 7 | 9.30 | 6″ 9 | 4.41 | 25° 16′ N. |
| | 17 | 8.48 | 6″ 3 | 4.38 | 25° 9′ |
| | 27 | 8.12 | 5″ 7 | 4.42 | 25° 10′ |
| *Jupiter* | 17 | 2.59 a.m. | 19″ 7 | 10.46 | 9° 11′ N. |
| *Saturn* | 17 | 7.59 | 7″ 4 | 15.47 | 17° 53′ S. |
| *Uranus* | 17 | 7.48 | 1″ 7 | 15.44 | 19° 32′ S. |
| *Neptune* | 17 | 9.18 p.m. | 1″ 2 | 5.8 | 21° 29′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Jan. 3 | 6.3 a.m. | *1st Qr.* | Jan. 10 | 9.46 p.m. |
| *Full* | ,, 18 | 8.17 p.m. | *3rd Qr.* | ,, 25 | 8.9 p.m. |

SUN.—Spots may still be expected to be few in number and small in extent; yet, notwithstanding, many are very interesting objects.

MERCURY cannot be said to be well placed for observation this month, owing to its great southern declination, even though it reaches its greatest elongation, 19° 8′ east of the sun at 7 p.m., on January 6th. On January 22nd, at 2.0 p.m., it is in inferior conjunction with the sun.

VENUS is daily improving in position, setting about 3h. 40m. after the sun at the beginning of the month.

MARS is fast decreasing in apparent diameter, but remains in capital position for observation.

JUPITER may now be observed late in the evening, rising at 9.11 p.m. on the 1st, and about two hours earlier at the end of the month.

SATURN, rising about 4.25 a.m. on the 1st, and about four minutes earlier each morning, can only be seen for a while before dawn.

URANUS is not far from Saturn, only farther south, and so is also ill-placed for study.

VARIABLE STARS to be be observed in January, are:—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| R. Cancri ... ... | 8.9 | 12° 7′ N. | 6·3 | <12·0 | |
| ζ Geminorum | 6.56 | 20° 45′ N. | 3·7 | 4·5 | 10d. 3h. 47m. 36s. |
| α Canis Maj. (Sirius) | 6.39 | 16° 32′ S. | 1 | | * |
| $O^1$ ,, ,, | 6.49 | 24° 5′ S. | 4 | | † |

* The ancients call this star Red, and compare it with Mars and Antares; it is now white.

† Is this star variable in colour and magnitude? It is now red, and much less brilliant than $O^2$ which follows it.

NEPTUNE is a very unsatisfactory object except with very powerful instruments, and then shows no detail; but it is still placed well for observation.

METEORS should be looked for on January 2nd specially, also 21st and 31st. Did any of our readers observe the brilliant meteor at a little after nine o'clock on Sunday night, November 29th?

A NEW COMET was discovered in the constellation Vulpecula, on November 2nd, by Mr. Perrine, at the Lick Observatory. It was visible only as a faint nebulosity, with a 12th-magnitude nucleus, with the fifteen-inch achromatic at Edinburgh Royal Observatory. When discovered it was in R.A. 20h. 20m., N. Dec. 25° 7′, its motion being towards the south-west, passing very close to Altair, the 1st-magnitude star in Aquila. According to Dr. Otto Knopf, of Jena, the perihelion will be passed February 8·1294 Berlin mean time.

THE YERKES OBSERVATORY will soon have its great telescope ready for use. The great object-glass, 41⅝ inch clear aperture, 61 feet focus, weighing by itself 515 lbs., and with its cell, etc., nearly as much again, is now finished. Without the rest of the telescope this magnificent object-glass will have cost something very nearly like £21,000.

SIRIUS, who now brightens our long evenings with his lustre, was discovered, so long ago as January 31st, 1862, by Alvan Clark, with a 19·07-inch achromatic, to have a 10th-magnitude companion, its position-angle being measured by Chacornac as 85° 1′, and its distance 10″·4. It must be very large—large enough to shine as a 1st-magnitude star, or it would not exert so great an influence on its brighter companion. Its position and distance were measured, on October 24th, 1896, as 189°, 3″·81, by Professor Aitken, at the Lick Observatory.

PROCYON, the 1st-magnitude star in Canis Minor, was long ago suspected to have a dark companion, because of the irregularities in its proper motion, and now we learn that, at the Lick Observatory, Professor Schaeberle has discovered a companion of the 13th-magnitude, position 318°, distant 4″·6.

M. LOEWY, long on the staff of the Paris Observatory, has been appointed its director, in succession to the late M. Tisserand.

DR. BENJAMIN APTHORP GOULD.—Astronomy has sustained a severe loss in the death of Dr. Gould, at Cambridge, Mass., on November 27th. Born in 1824, he founded the *Astronomical Journal* in 1849, and edited it until 1861, when the Civil War brought about a suspension of its publication. He, in 1866, by aid of the newly laid Atlantic Cable, was the first to determine the difference in longitude between Europe and America. He went to the Argentine Republic in 1870, and accomplished excellent work, for not only did he compile a catalogue of the southern stars, and map a considerable portion of the same heavens, but also built the national observatory at Cordova, and organised the work in the country, establishing a number of stations in connection with that centre. Harvard University bestowed upon him the degree of LL.D. on his return in 1885, and later Columbia College conferred a similar degree. The Doctor resumed the publication of the *Journal* and has accomplished other good work. He has now passed away in his seventy-third year.

# SCIENCE GOSSIP

Mr. Rémy Perrier has lately studied the holothurians found by the "Talisman" expedition; the material being in the Museum of Paris. These animals were found inhabiting immense depths in the ocean. He has examined 354 individuals of nine different genera, two of which are new to science.

Dr. Thomas Appleton, Science Secretary of the Fulham Society of Literature, Science and Art, has asked us to inform our readers that the Society will be very pleased to welcome any of them to the Lecture on Birds, by the Rev. J. W. Horsley, on January 7th, to which reference was made *ante* page 195. No tickets will be necessary.

Geologists who find difficulty in naming some of their specimens, will find in the December number of "Natural Science" a list of specialists in various groups who are willing to assist them; these include authorities on most sections, but help is still required, as we no not see in the list anyone to advise on trilolites, belemnites or Palæozoic brachiopods.

The oldest known pear-tree in Europe has succumbed to one of the recent storms. It grew in a garden between Toulon and Vilette du Var. It was known to have been planted nearly six hundred years ago, in the reign of Queen Jeanne, whose name it bore. This venerable tree measured twelve feet in circumference at the middle of the trunk.

In consequence of the difficulties raised in some quarters against the use of acetylene, on November 23rd last there met in Paris a number of those interested in its manufacture, who formed themselves into "The Société Technique de l'Acetylene," for mutual protection, which will include those who manufacture the carbide and the by-products, also the larger consumers of this splendid light.

Acetylene gas, described in Science-Gossip, (N.S. vol. i, page 278), is rapidly becoming a recognized illuminant. It is now manufactured in large quantities in Switzerland and other parts of Europe, and at Niagara. The calcic carbide, from which it is produced, is delivered for private consumption in convenient carriers, and we have lately seen in France an inexpensive and admirable gasometer for generating acetylene gas for private houses.

The seventieth anniversary of the veteran guide, Almer, was recently celebrated at Grindelwald, who has made upwards of one hundred ascents each of the Jungfrau, the Mœnch, the Eiger, the Wetterhorn and the Schreckhorn. Almer was the first to climb all these heights excepting the former. He is the only person who has made the descent from the Mœnch to the Wengernalp. There is not a single mountain in Oberland, the Valis, the Grisons, Savoy and Dauphiné whose summit he has not reached.

In the November issue of Science-Gossip (page 164), an error appeared from some unexplainable cause, to the effect that Mr. Edward Wilson, F.G.S., was "the curator of the British Museum." It is hardly necessary to say that it should have read Bristol Museum, to which institution he has written a guide.

There died at San Remo, in December, in his sixty-third year, the celebrated Swedish engineer, Alfred Nobel, the inventor of dynamite and smokeless gunpowder. Originally comparatively poor, Nobel commenced business as a chemist and engineer with a capital of £160, and has died worth over two millions sterling. He was comparatively unknown to the general public. His last important invention was for the manufacture of artificial silk with a form of guncotton (celluloid) as its basis.

An instance of the effect of electric light upon the increased vigour of plants is notable in the public gardens at Nice, where the grass is renewed each year from seed. Those blades in the immediate neighbourhood of the large electric lamps are not only larger in size, but brighter green in colour. The seeds of this grass are usually planted in the middle of October on perfectly bare ground; the former crop having succumbed to the intense sunshine of July and August. Within a month of sowing the whole gardens are brilliantly green, and it is at that period one first sees the difference beyond the reach of electric rays.

The first annual report of the Moss Exchange Club has been issued to members, and shows a good record of work done during the first year of its existence. More than 2,000 Mosses and Hepaticæ were distributed among its twenty-five members. The next exchange will take place in March. Mosses may be sent in to be named as specimens for exchange, and in this way the Club will prove useful to beginners, as well as to those who desire to have help with difficult and critical species and varieties. New members can still be enrolled, and should communicate with the hon. secretary, Rev. C. H. Waddell, Saintfield, Co. Down.

Royal Institution. — The following are the lecture arrangements before Easter:—Professor Silvanus P. Thompson, six lectures (adapted to a juvenile auditory) on Light, Visible and Invisible; Professor Augustus D. Waller, twelve lectures on Animal Electricity; Professor Henry A. Miers, three lectures on Some Secrets of Crystals; Dr. J. W. Gregory, three lectures on The Problems of Arctic Geology; Professor Percy Gardner, three lectures on Greek History and Extant Monuments; Professor W. Boyd Dawkins, three lectures on The Relation of Geology to History; Mr. Carl Armbruster, three lectures on Neglected Italian and French Composers; Mr. Walter Frewen Lord, three lectures on the Growth of the Mediterranean Route to the East; and the Right Hon. Lord Rayleigh, six lectures on Electricity and Electrical Vibrations. The Friday evening meetings will begin on January 22nd, when a discourse will be given by Professor Dewar. Succeeding discourses will probably be given by the Right Rev. the Lord Bishop of London, Professor Jagadis Chunder Bose, Professor John Milne, Dr. G. Johnstone Stoney, Lieut.-Col. C. R. Conder, R.E., Mr. Shelford Bidwell, Professor Arthur Smithells, Sir Edward Maunde Thompson, Sir William Turner, Mr. Charles T. Heycock, the Right Hon. Lord Rayleigh and other gentlemen.

# NOTES & QUERIES

REPRODUCTION OF LOST LIMBS IN BIRDS.—A correspondent writes to ask if there are any cases on record where it has been known that birds have reproduced lost limbs, *i.e.* toes or the whole foot, in the same manner, for instance, as a lizard is known to reproduce a lost tail.

BIG FUNGUS.—Mr. Barbour's big mushroom reminds me that two months ago Mr. A. J. Cook, of Upper Norwood, brought to me a large spheroidal fungus which grew in his garden and which weighed just a trifle under two and a-half pounds. The exact circumference was not taken, but it could not have measured less than 24 inches.—*Edwd. A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

FOSSIL FERN AT GIANT'S CAUSEWAY.—More information in regard to this interesting note is to be hoped for. Can Mr. Barbour give particulars of some sort? I do not think it could have been a true fossil. Did it resemble any ferns now growing in the locality? Possibly a wind-blown specimen left an impression of itself as it decayed. Did it appear like this at all? Presumably the honeycomb is made up of basaltic (igneous) columns, in which, of course, no fossil remains can be found.—*Edwd. A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

PUBLICATION OF LOCALITIES.—I know the neighbourhood referred to by Mr. Carrington so well, that without referring to his note in SCIENCE-GOSSIP, I could find his locality at any time, and I must confess I entirely agree with Mr. F. R. Rowley's remarks on page 194. In regard to butterflys, it may perhaps be of interest to your readers to know that the Selbourne Society is issuing a leaflet by Mr. Kirby, entited "A Plea for the British Butterfly," a copy of which I would post to any one desiring it.—*Edwd. A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

PATERNAL AFFECTION IN WILD BIRDS.—On May 17th, 1896, I saw three young starlings in a wicker cage, on the lawn at the back of a country hotel in Essex. The birds were nearly full fledged, but the hen parent bird kept flying down from the trees on either side, and feeding them through the bars of the cage. After a time the cage was moved indoors, and the anxiety of the parent bird was really pitiable, as she flew backwards and forwards across the lawn with a grub in her bill, looking for her young ones, who kept answering her call from indoors and whom she could plainly hear through the open window. I have never seen a more lively expression of anxiety and grief shown in a bird. So long as she was allowed she came to feed her little ones, totally regardless of myself and several other persons, accompanied by a lively terrier or two, who watched her at three or four yards distance. I was assured by a native that if parent birds are allowed to feed their captive young too long in this manner, finding they cannot get them away, they will bring as food poisonous berries, and so kill them in despair. As I could not persuade the owner of the cage to carry out the experiment for a consideration, and let me have the dead birds for dissection, I have not been able to prove this assertion; but I should be pleased to hear if any of your correspondents can offer any evidence for or against it.—*F. W. Halfpenny, Forest Gate.*

ORCHIS MACULATA.—Varieties of this orchid exhibit not only various forms in the middle lobes of their labella, but also remarkably in their tints, and especially in the markings themselves. From near Godstone, in Surrey, I obtained last year, a specimen which I could not resist the temptation of plucking; it measured six inches from the base to the appex to the spike of flowers, and bore, so far as I am able to judge from the dried specimen, forty flowers.—*Edwd. A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

ORCHIS MACULATA.—Dr. Bryan's remark, "A complete classification of all the varietal forms occurring in this variable plant would form a pleasant task for a summer vacation," reminds me of an excursion I once took with "The Natural History Society of Hemel Hempstead," in the month of May, 1882. We drove to Ayot St. Laurence, and on returning to Hemel Hempstead, about a mile from that place, drove through Lammas Park; it consists of a considerable extent of dead-level grass land, and scattered over this land were patches of over an acre in extent purple with millions of *Orchis morio*. The sun was setting, and the ruddy purple light reflected from them was a sight I shall never forget. The party immediately descended and gathered a considerable quantity. I collected samples of the following: common purple, dark inky purple, pale lilac and pale flesh-colour (more rosy than purple), also three (these I took with the root) of a very pale yellow with green veins. I forwarded them to Rev. Harpur Crewe, who remarked he had never seen the *true white* one before. I hope I shall not offend any keeper of an "Old Curiosity Shop" by divulging the locality to "all and sundry"; but should this be so, it may be some consolation to him to know that, when young, I was told that "black sheep" measure less, not more than white ones. I have collected all my life, and never kept a good locality for an insect or plant secret.—*Bernard Piffard, Hill House, Hemel Hempstead.*

DERIVATION OF "CLEAT."—Referring to Mr. Roberts' query as to the derivation of the word "cleat" (p. 165, of your November number), the words "clot," "clote" (Anglo-Saxon, "clâte") are applied to two other plants, the burdock and yellow water-lily, as well as to the coltsfoot (see "Hunter's Encyclopædic Dictionary"). "Clate" is also applied to a piece of iron worn on the shoes of horses and country people, and is probably the origin of the word "clout" (Dutch, "cluit," "clout"—a clod or lump). From a quaint book I possess, published in 1579, and entitled "Bullein's Bulwarke of Defence against all sicknesse, soarnesse and woundes that doe dayly assaulte mankind," I extract the following part of a dialogue: "Marcellus: What say you of *Ungula cabellina* or *Tussilago?* Hilaring (the gardener): It is called *Ungula cabellina*, ye is horshoue, because no herbe is liker, but the Greekes call it *Bechion*, which is *Tussilago*, ye is to help ye cough. It is comonly known, some call it *clot-leaves:* whyte on the one syde and greene on the other side, and groweth near waters and in fallow lands,'" etc., etc. I

should think that Cleat Hill, Bedford, may be merely "hill of clods," unless there are many burdocks thereabouts, in which case it may be the "hill of burs" (German, "kleete," a bur), hence, perhaps, "clate," "bur," "cleate," as applied to the coltsfoot, is clearly horseshoe (see "Miller's Dictionary of English Names of Plants").—*M. J. Teesdale, St. Margaret's, Thurlow Park Road, Dulwich; October 27th,* 1896.

Iron embedded in Ivory.—In Sheffield recently while workmen were sawing an elephant's tusk of unusually fine ivory, further progress was suddenly arrested by a hard substance which, on examination, proved to be a portion of an iron spear which was completely embedded in the centre of the tusk. It is supposed that, when quite young, the animal was struck by a spear which was broken in two at the root of the tusk, the growth of ivory, in course of time, surrounding it. The bit of spear, about six inches in length, is very rusty, and must have remained in its curious resting-place for a great number of years. The tusk is in the hands of Messrs. T. Cooke, and Son, Museum Street, London.

Nitella growing in Aquarium.—It is often remarked that while *Chara* flourishes sufficiently well floating free in a small aquarium, *Nitella* gradually dwindles and dies. This is more unfortunate because the latter is far superior for exhibiting circulation of the protoplasm, always so much appreciated by the friends of a microscopist, or at soirée. I have, however, had *Nitella* growing successfully for eighteen months in an aquarium holding about a pint of water, and in one slightly larger it fruited during this summer. All that seems neccessary to ensure this result is that some of the lower portion, say two or three nodes, should be inserted in, and covered by the sand and shingle it is desirable to have at the bottom of the vessel, where roots are soon produced giving the plant the attachment which appears requisite for its well being. Of course if an entire specimen with roots complete, as described in Dr. Cooke's "Ponds and Ditches," can be secured and accommodated it is better, but that is not always possible, and takes considerable space.—*James Burton,* 9, *Agamemnon Road, West Hampstead.*

Microscopic Slides—We have received from Ernest Hinton, of 12, Vorley Road, Upper Holloway, London, preparations of Bryozoa. The first is *Bugula turbinata*, which has been killed with the polypes fully expanded as in life, a most lovely example, either with direct light or paraboloid. The other is *B. flabellata*; in this every trace of animal matter has been carefully removed, leaving only the glassy polypidom with its "bird's head" processes, the result is one of the most gorgeous polariscope objects that it is possible to imagine, the colours even without selenite are beautiful.

Yorkshire Naturalists. — The Yorkshire Naturalists' Union have just issued Part 20 of their "Transactions." It contains some interesting notes on the Lepidoptera and Coleoptera of Yorkshire, and the Presidential Address for 1895 on the "Study of Mosses," by Mr. Robert Braithwaite, President of the Union. Mr. John McSandesborough, F.R.A.S., F.R.Met.S., etc., and Mr. Alfred E. Preston, M.Inst. C.E., F.R.Met.S., have contributed an Appendix consisting of ten tabulated sheets, giving the Meteorology of Bradford during the years 1891 to 1895.

## TRANSACTIONS

The South London Entomological and Natural History Society.—November, 26th, 1896. Mr. C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. Barnett, of Royal Hill, Greenwich, was elected a member. The meeting was devoted to a special exhibition of varieties, and was largely attended. Mr. Mansbridge showed series of *Abraxas grossulariata*, including the Leeds smoky forms; of *Polia chi*, including var. *suffusa* and var. *olivacea*, with the beautiful West Riding form; and of *Hibernia aurantiaria* with many melanic forms. Mr. Oldham, *Brenthis (Argynnis) euphrosyne*, with few markings on upper wings in contrast to well-marked hind-wings; a xanthic *Epinephele janira*, and pretty-coloured and yellow females of *Odonestis potatoria*. Mr. Adkin, the various forms of *Boarmia repandata; Camptogramma bilineata*, including black Irish specimens; *B. cinctaria* and *Thera juniperata*, with beautiful specimens of *Cidaria corylata* var. *albocrenata; Abraxas grossulariata;* black *Acidalia marginepunctata;* black-banded *Eubolia bipunctaria;* banded *Anaitis plagiata*; and unicolorous *Ematurga atomaria.* Mr. Mitchell, specimens of *Saturnia pavonia (carpini)*, (1) dark female, (2) gynandromorphous form, bred from Wicken; and an example of *Chrysophanus phlæas*, with large and elongate spots nearly forming a band. Mr. Dollman, a series showing the variation of *O. potatoria;* a dwarf *Anthrocharis cardamines;* and an example of the same species with the dark tips of the primaries suffused and extending inwards. Mr: Ashdown, a series of *Coccinella hieroglyphica*, varying from entirely testaceous, through spotted forms to entirely black, all from Oxshot. Mr. Barrett, series of the following species from very many localities: *Melanippe hastata, M. tristata, M. fluctuata*; *Boarmia repandata* (including some very fine black forms); *Eupithæcia togata* (including the very dwarf race), *E. extensaria, E. sobrinata* and *E. stevensata.* Mr. Auld, the first known bred British *Callimorpha hera* var. *lutescens*; series of *Spilosoma lubricipeda* with its var. *zatima* and var. *fasciata*, together with a number of intermediate forms; a broad-banded *A. plagiata*; and vars. of *Dicycla oo*, *Spilosoma urticæ* (without dorsal spots), and *Lomaspila marginata.* Mr. Levett, vars. of *Callimorpha dominula*, bred from Deal, three of which were the yellow forms. Mr. Mera, three vars. of *Arctia caja* (1) with inner half of fore-wings almost completely white; (2) with white markings of fore-wings only slightly indicated; (3) white almost covering fore-wings, and black on hind-wings much diminished; a *Cidaria siterata*, pale brown with paler lines, reminding one of *C. reticulata*; *Hadena thalassina*, with absence of usual markings, and of an almost uniform smoky grey; an *Arctia villica* with smoky hind-wings, and one with black suffused over all the wings; and a *Brenthis (Argynnis) euphrosyne* with confluent spots across the centre of both wings. Mr. Turner, the most distinctive forms of *Hibernia leucophearia, Gnophos obscuraria* and *Oporabia dilutaria*; a *Cœnonympha typhon*, with a series of well-developed ocellations and a large white patch on the upper side of the hind-wing, from

Carlisle; and on behalf of Mr. Wilkenson, of Carlisle, a very variable series of *Melitæa aurinia (artemis)* including several good aberrations. Mr. H. Moore, exotic Orthoptera, including (1) *Loscusta peregrina* from several localities, showing great variation in density of colour; (2) *Pachytylus migratorius* var. *cinerascens*; (3) a long series of *Œdipoda fasciata*, from many places, and varying with the soil upon which it rests; and some ten species of American Œdipodidæ. Mr. T. W. Hall, conspicuous varieties of the following species: *Arctia caja* (one almost black secondaries); *Spilosoma lubricipeda* (one of var. *zatima* taken at Wicken); *Sesia culiciformis* (yellow-banded), *Polia xanthomista* (var. *statices*); *Demas coryli* (banded); *Mamestra persicariæ* (unicolorous black), *Xylina conspicillaris*, and many other species. Mr. Frohawk, his fine series of undersides of *Enodia* (*Epinephele*) *hyperanthus* varying from extreme var. *arete* to the beautiful var. *lanceolata*; and vars. of *Papilio machaon*, including a very dark tawny form bred from Wicken. Mr. Tutt, his specimens of *Melampias melampus* and *M. pharte* upon which he bases his opinion that they are only forms of one species, and his series of the hitherto supposed distinct *Cænonympha iphis* and *C. satyrion*. Mr. Dawson, a dark male of *Dryas* (*Argynnis*) *paphia* somewhat approaching var. *valezina* of the female; Shetland forms of *Camptogramma bilineata*; a var. *schmidtii* of *Chrysophanus phlæas*; and a *Tæniocampa incerta* with much intensified transverse lines.—December 10th, 1896. Mr. C. G. Barrett, F.E.S., Vice-President, in the Chair. Mr. Step exhibited the "pen" of the squid, *Loligo vulgaris*. This species is common on the Cornish coast, but the pen is never found on the shore as is the shell of the *Sepia*. No doubt the *Loligo* meets its death by being eaten by some large predaceous fish, and the soft pen would be more or less assimilated. The squid is much used as bait for conger, and is caught very cautiously with pilchards as bait. He also exhibited specimens of the crabs *Xantho incisus* and *X. hydrophilus*. Mr. Brooks, a very long series of *Acherontia atropos*, bred from pupæ obtained at Long Sutton this year. One specimen was much lighter on one side than on the other, it was suggested that a deficiency of fluid in the wings through injury was the cause. He also exhibited a very long series of *Triphæna fimbria*, bred from larvæ collected near Rotherham. Many specimens were light and only very few of the dark form. It was stated that the colour variation was by no means sexual and tended to follow the parent colouration. Mr. Mansbridge exhibited a long and very variable series of *Agrotis auxiliaris* from North America, taken in 1893, and read a paper on the exhibit, describing the forms of variation, life-history and distribution of the species. Mr. Barrett, two specimens of *Agrotis subgothica*, said to have been captured by Raddon, of Barnstaple, and also forms of *A. tritici* of the var. *subgothica*. A discussion ensued in which it was conclusively proved, by reference to Doubleday and others, that the *bona fides* of Raddon could not be relied on. Mr. Adkin read an addendum to his previous paper on *Triphæna comes* (*orbona*), giving more detailed evidence of the occurrence of the species and its var. *curtisii* in various localities. He also exhibited some Shetland forms of *Camptogramma bilineata*, one having a dark fascia, broad and complete, with a pale central blotch. Mr. Dennis, microscopic slides, showing the striking distinctions between the antennæ of *Hybernia aurantiaria* and *H. defoliaria*.—*Hy. J. Turner, Hon. Report. Sec.*

Royal Meteorological Society.—The monthly meeting of this Society was held on Wednesday evening, the 16th inst., at the Institution of Civil Engineers, Mr. E. Mawley, F.R.H.S., President, in the Chair. An interesting paper, by Dr. Leigh Canney, on the "Winter Climate of Egypt," was read by the Secretary. "The climate of Egypt during the winter is influenced," he stated, "by the Libyan Desert, by the Mediterranean Sea, and by the extent of cultivated land." The author gave the results of a series of observations which he had carried on during the past three winters. The observations were started with the object of arriving at a comparative knowledge respecting the climates of the various stations now considered as health-resorts in Egypt, and by a strictly comparable method to arrive at the precise differences between the climates of Upper and Lower Egypt, all previous observations having failed in this respect. The stations at which observations were made were Cairo, Helouan, Mena House Hotel, Luxor, Assouan, Valley of the Tombs of the Kings, and the crest of the Libyan Hills. As self-recording thermometers and hair hygrometers were used at each station, valuable data has been obtained on the diurnal variation of temperature and humidity. Mr. R. H. Curtis also read a paper on "An Attempt to determine the velocity equivalents of wind forces estimated by Beaufort's scale." The author has compared the anemometric records at Scilly, Fleetwood, Yarmouth, and Holyhead, with the wind forces as estimated by the observers at the same or adjoining stations, and has by this method obtained a satisfactory table of velocity equivalents in miles per hour for the estimated forces by Beaufort's scale.

North London Natural History Society.—Thursday, November 26th, 1896. Mr. L. B. Prout, Vice-President, in the Chair. The curator announced a donation to the society's collection of Lepidoptera from Mr. Prout, including *Scotosia rhamnata*, *Pericallia syringaria*, *Cosmia affinis*, *Taeniocampa populeti*, *Thyatira derasa* and *T. batis*, from Epping Forest, and *Sesia tipuliformis* and *Agrotis nigricans* from Dalston. Mr. Austin had taken a walk in Epping Forest on the 14th inst., and recorded the following birds: blackbird, robin, golden-crested wren, long-tailed tit, great tit, blue tit, wagtail (? species), chaffinch, starling, jay, jackdaw, rook and pheasant, also three squirrels in Monkwood. He had noticed an unusual profusion of berries, particularly holly-berries and hips and haws. Miss M. E. Robinson mentioned that she had a singing mouse at home. She thought the curious noise produced by this animal was probably caused by some pulmonary affection. Mr. C. Nicholson, F.E.S., was elected President for 1897. A discussion subsequently took place on "The Planet Jupiter."—*Lawrence J. Tremayne, Hon. Sec.*

City of London Entomological and Natural History Society.—Tuesday, December, 1st, 1896 (Annual General Meeting). Exhibits: Dr. J. S. Sequeira, a specimen of *Catocala promissa*, taken in the New Forest, having the upper wings of the rich dark-brown frequently occurring in its congener, *sponsa*. Mr. Bacot, a short bred series of *Trichiura crataegi* and *Orgyia gonostigma*. A short discussion ensued as to the double-broodedness of the latter in nature. The election of Council for 1897 having been accomplished, Mr. Nicholson read the Treasurer's account (in the absence of Mr. J. A. Clark) and the report of the Secretary; both statements were duly adopted. Mr. J. W. Tutt

then read his presidential address, dealing with the philosophical aspect of Entomology, variation in the colours of insects, speculation in Entomology and other interesting topics.—*C. Nicholson and L. J. Tremayne* (*Hon. Secs.*)

Conchological Society (London Branch).—On November 6th, the first Meeting for this winter was held at Walham Green, by invitation of Mr. William C. Smith, when a pleasant evening was spent in examining Mr. Smith's collection of shells. The most noteworthy specimen was *Tellidora burnetti* (Brod. and Sow.), a curious flattened bivalve from California. The Rev. J. W. Horsley exhibited, on behalf of Mr. A. G. Stubbs, a very fine series of *Helix virgata* (from Tenby), comprising almost every known variation of this variable shell. On December 10th, Mr. S. J. Da Costa very kindly invited members to view his magnificent collection. One evening was quite insufficient to see all the varieties it contained. We particularly noticed the very fine series of *Bulimus* and its allies (chiefly from Central America), including several type specimens and many rare shells. There were also excellent sets of *Cochlostyla*, *Amphidromus*, and West Indian Helices. Among the marine shells the brilliant examples of *Pecten* and *Cypræa* were much admired. Besides these we noted some beautiful *Pteropoda*, a collection of the curious Mollusca which inhabit Lake Tanganyika, and a very pretty series of the quaint *Opisthostoma* from Borneo.—*J. E. Cooper*, 93, *Southwood Lane, N.* (*Hon. Sec.*).

The Greenock Natural History Society held its annual meeting at the end of September, and it is satisfactory to find the interest in Natural Science is so active in the district that the continued success of the Society seems likely to continue. The address of the Secretary is Mr. G. W. Niven, 23, Newton Street, Greenock.

The first meeting of the Royal Meteorological Society for this Session was held on Wednesday evening, the 18th November, at the Institution of Civil Engineers, Great George Street, Westminster. Mr. W. Ellis gave an account of the proceedings of the recent International Meteorological Conference, which was held at Paris from September 17th to 23rd. The Hon. F. A. Rollo Russell read a paper on "Haze, Fog, and Visibility." Haze, he says, is most prevalent when the wind is from the north-east, and is probably due to excess of dust brought about by conflicting currents.

## NOTICES OF SOCIETIES.

The South London Entomological and Natural History Society.

Jan. 14.—Mr. Step will read a paper, "Some Marine Mimics"; and Mr. Hewett will read a paper, "The *Tephrosias*," with a very large exhibit.
Jan. 28.—Annual Meeting at 7.

North London Natural History Society.—The following are amongst the fixtures for next session:

Jan. 2.—Fifth Annual Exhibition.
,, 14.—Presidential Address.
,, 28.—Short Papers on 1896.
Feb. 11.—Discussion on "Overcrowding and its Remedies." Opened by L. J. Tremayne.
Mar. 27.—Visit to the Epping Forest Museum.
Apr. 8.—Discussion: "The Filices or Ferns." Opened by R. W. Robbins.
May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.,
,, 15.—Whole-day Excursion to Brentwood.
,, 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
,, 10.—Debate: "Is Vivisection Justifiable?"
,, 19.—Half-day Excursion to the Lea Valley.

There will also be a special-family discussion entitled, "The Liparidæ," to be opened by Mr. A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Marine shells from Loyalty Islands, Australia, and elsewhere, also New Zealand ferns (dried), in exchange for marine shells not in collection; send lists.—L. Shackleford, 14, Edna Street, Crumpsall, Manchester.

A few examples of Petricola pholadiformis, Lamk., from Herne Bay; desiderata, other rare British shells.—A. S. Kennard, Benenden, Mackenzie Road, Beckenham, Kent.

"Quekett Journals," Moore's "Hepaticæ," O'Meara's "Diatoms"; what offers? Wanted, "Journal of Botany," 1870, Science-Gossip, 1870-75.—C. H. Waddell, Saintfield, Co. Down.

Slides, minerals, polished corals and sponges, fossils, objects, curios, Haldon upper greensand fossil, corals and shells, etc., for suitable exchanges.—A. J. R. Sclater, Natural History Store, Teignmouth.

Offered, Science-Gossip, 1885-87, 1890, 1892, Slack's "Pond Life," small collection of polished agates, etc. Wanted, micro. slides, etc.—William Gomm, Overndale Villa, Downend, near Bristol.

Wanted, a type collection of British grasses, old works on the gramincæ, and to exchange grasses.—G. O. Benoni, Codney Vicarage, Brigg.

A quantity of micro. slides for exchange; photo lens or offers requested.—A. Draper, 179, Cemetery Road, Sheffield.

Gannet skin, micro. slide labels, parasites in spirits and other named unmounted objects. Wanted, British insects, pinned or carded, or offers.—Chas. J. Watkins, King's Mill House, Painswick, Gloucestershire.

I will send selection of each of following in exchange for one micro. slide: spines (brittle starfish), foraminifera sand, spines (Echinus) and nautilus on seaweed.—Borrows, 18, Pensbury Street, Darlington.

Mrs. Carphin, M.C.S., 52, India Street, Edinburgh, offers many good recent shells, and some fossil ones, for exchange; send lists of offers and desiderata.

# THE MANNA OF THE ISRAELİTES.

By M. J. Teesdale.

IN a recent botanical work of authority [1] occurs the following passage: "It should be mentioned that the manna sent to the Israelites on their journey out of Egypt to the Holy Land is identical with the lichen described here and figured on page 695, and the older view that the manna of the desert was the sap of a tamarisk (*Tamarix gallica-mannifera*) exuded under the influence of a parasite is without any foundation."

The lichen thus positively asserted to be identical with the manna of Scripture (see Exodus xvi. and Numbers xi.) is described in the same work as consisting of three species, spread over an enormous region in South-West Asia and extending as far as the south-east of Europe and the north of Africa. It was first observed by the celebrated naturalist and traveller, P. S. Pallas, in 1769, in the deserts of Tartary, and was named *Lecanora esculenta*, Pallas (fig. 1*a*); it is also known as *Sphærothallia esculenta*, Nees. "It forms," says Professor Kerner, "thick, wrinkled and warted crusts on the stones, preferably on small fragments of limestone; the outer colour of the crust is a greyish yellow, while on breaking it appears as white as a crushed grain of corn." The Algerian specimens in the Cryptogamic Department of the Natural History Museum are smaller than the Asiatic, and are of a reddish colour, probably borrowed from the soil on which they are rolled about, as hereafter described. "As they get older the crusts become rent, and separate either partially or wholly from their substratum, to which they were only lightly attached by root-like fringes. When they first become loosened the edges of the detached portion become somewhat rolled back. The rolling then continues, and ultimately the loosened piece forms an elliptical or spherical warted body, with a very much contracted central cavity. . . . . As a rule the hole is filled with air, and when dried the pieces weigh very little. It is easy to see that the loose portions will be rolled about by the wind, and that a storm will sometimes sweep them up from the ground and carry them hither and thither through the air. In rainy seasons the manna-lichen is also washed by rivulets into the depressions in the Steppes, and in some years in

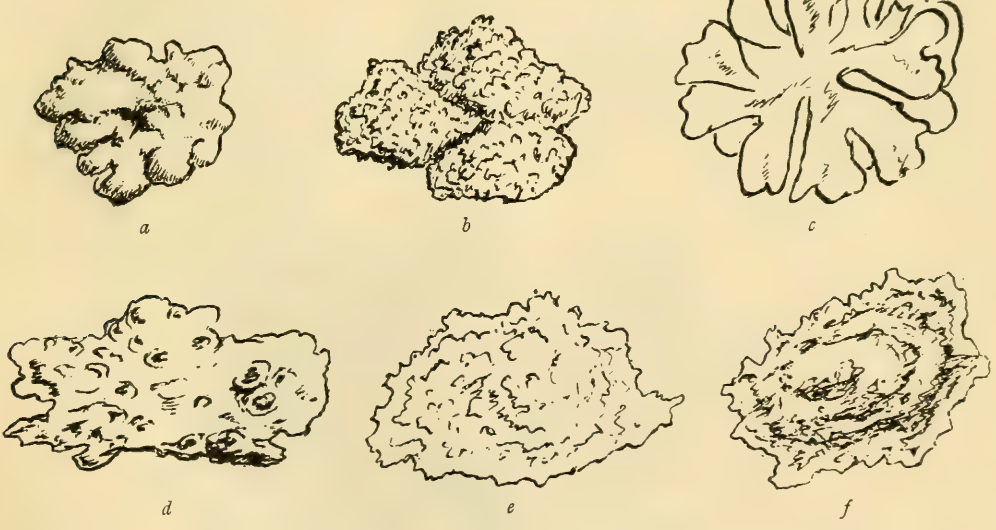



Fig. 1.—The Edible Lichen, the Alleged Manna of the Israelites, and Allied Species.

*a, Lecanora esculenta*, Pall; *b, Lecanora affinis*, Ehr.; *c, Lecanora affinis*, Ehr. (section showing dichotomous growth); *d, Lecanora tartarea* (brought in shiploads from Sweden under the name of Swedish moss, and used in the making of the blue dye "Litmus" or "Lacnius"; grows also in the Canary and Cape Verde Islands); *e, Lecanora fruticulosa*, Ehr.; *f, Lecanora fruticulosa*, Ehr. (section showing concentric growth).

(1) "The Natural History of Plants," from the German of Anton Kerner von Marilaun, Professor of Botany in the University of Vienna. Translated and edited by F. W. Oliver, M.A., D.Sc., Quain Professor of Botany in the University of London. Vol. ii, p. 812.

such quantities that they form heaps a span high, and one man can in a day collect four to six kilogrammes (about 12,000 to 20,000 pieces, varying in size from a pea to a hazel-nut). This is especially the case in the Steppes region and in the high lands of South-West Asia, where the manna-lichen is used

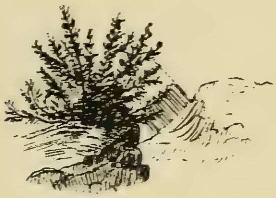


Fig. 2.—Tamarix gallica.—Shrub.

as a substitute for corn in years of famine, being ground in the same way, and baked into a species of bread. . . . All the great so-called rains of manna, of which news has come from the East to Europe, occurred at the beginning of the year, between January and March, *i.e.* at the time of the heaviest rains."

inches. Göbel analysed these, and believed them to have been carried by electrical winds from distant localities. He believed it to be *Parmelia esculenta* (another synonym of *Lecanora esculenta*), a native of the Steppes and the districts between the Caspian and Aral Seas. In 1829, during the war between Persia and Russia, there was a great famine in Orumiah, south-west of the Caspian. One day, during a violent wind, the surface of the country was covered with a lichen which "fell down from heaven." The sheep immediately attacked and eagerly devoured it, which suggested to the inhabitants the idea of reducing it to flour and making bread of it, which was found to be good and nourishing.

In the spring of 1841 there was an astonishing fall of the same substance near Lake Van, in the east of Asia Minor. It covered the ground three or four inches in depth. The pieces were of the size of hailstones, grey in colour and pleasant to the taste. A white meal was prepared from them which provided a rather tasteless bread.

In January, 1846, at Jenischehir, in the west of Asia Minor, and the surrounding districts, during a time of famine, a similar fall took place. It lasted some days, and the pieces of lichen were of

Fig. 3.—Tamarix gallica.—Tree.

In an article in the "Gardeners' Chronicle" for September, 1849, it is stated that this lichen springs up with great rapidity after rain on the Khirgiz Steppes and in Central Asia, and it is mentioned that accounts had then recently been received of the fall—as it were from the skies—of prodigious quantities in one night in the neighbourhood of Erzerúm, in Armenia. It is added that Parrot brought specimens collected in the beginning of 1828 which were said to have descended from the skies in some districts of Persia, and to have covered the ground to the depth of five or six

the size of hazel-nuts. They were ground into flour, the bread from which was pronounced little inferior to wheat bread. Another account says that the manna was of a greyish-white colour, rather hard and irregular in form, inodorous and insipid.

In the year 1847 a report was made by General Jussuf, the Commander of the French troops, to the Governor of Algiers, on the subject of an edible lichen spread over a large portion of the Sahara and the Algerian plateaux, which he said had been a sustenance to the troops during the

campaign, especially as provender for the horses. It was named *Chlorangium jussufii*, Link., but is identified by lichenologists as *Lecanora esculenta*, Pall.

On the whole there is no doubt that this curious natural product has been food for both men and animals in the several countries where it has fallen, but it is said that the sheep in Algiers do not thrive upon it, and no doubt it contains in its composition very slight nourishing properties. Sir Roderick Murchison, the geologist, wrote in the "Gardeners' Chronicle" for August 13th, 1864, as to specimens of manna-lichen—sent to him by the Austrian Internuncio at Constantinople—which fell with a gust of rain at Charput, north-west of Diarbekir, Asia Minor, that the specimens contained more than sixty-five per cent. of oxalate of lime, with twenty-five per cent. only of amylaceous matter, allied to starch, of which Iceland moss, the food of the reindeer, contains eighty per cent.

We may assume that the manna brought to the Israelites was, like the quails, a local natural product, provided in harmony with the pre-ordained laws of the universe, and can proceed to consider whether the *Lecanora esculenta*, or some other product, most nearly accords with the Scriptural description of manna. Numerous trees and shrubs exude sweet gums, to some of which the name of manna is applied, but only a few of them are worthy consideration in connection with this subject.

Fig. 4.—Tamarix gallica. Flowering Branch.

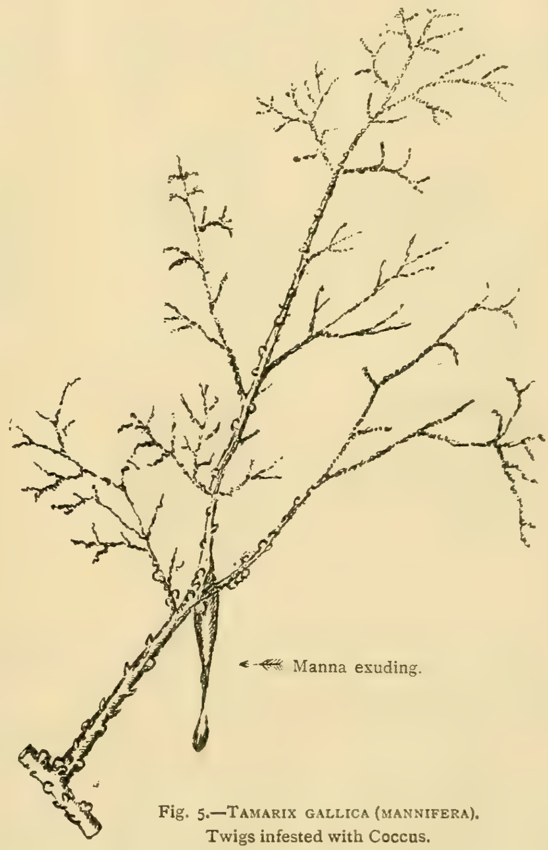



Fig. 5.—Tamarix gallica (mannifera). Twigs infested with Coccus.

One of these is yielded by a thorny leguminous shrub, very common from the North of India to Syria, and plentiful in the Wilderness of Sin. It is called by the Arabs "Alhaj" (*Alhagi* of Linnæus). Two species, *Alhagi maurorum* and *A. desertorum*, are called by them "Ooshter Khar," or camel's-thorn, and in Mesopotamia "Agool." The leaves of *A. maurorum* exude a sweetish juice (Arabic "Ter enkjubin" = moist honey), which concretes into small granular masses, and which is usually distinguished by the name of Persian manna. It contains, amongst various sorts of particles, a great number of globular, crystalline and almost transparent bodies of different sizes and of a yellowish-white colour. The biggest of

these does not exceed a large coriander seed in size, and they have somewhat the appearance of small lumps of mastic. Tournefort says that it is chiefly gathered about Tauris, a city of Persia, during great heats in that part of the world, but it is indigenous over a large part of the East, yielding manna, however, only in Persia, Bokhara, Arabia and Palestine. Extensive plains are in these countries covered with the camel's-thorn, and it is of great importance as food for camels as well as for sheep and goats. From the wounds produced by the browsing of these animals, the manna chiefly exudes. It is collected by the Arabs and caravans which cross the desert, and is used as food. It is gathered by shaking the branches. This *Alhagi* does not appear to be the same shrub as that which the traveller Wellsted found bearing manna in the Wady Hebron, on his journey from Tor to Mount Sinai, in September, 1836, "fifteen miles from the sea, and at an elevation of about 2,000 feet." That shrub was called "gavan," was about two feet high, and bore a striking resemblance to the broom.

In Kurdistan, Dr. Wright found in one part of the mountains great quantities of a sweet substance on the leaves of certain trees, generally the oak and gall-nut tree, and which is called "gezza" in Kurdish, and "manna" in Syriac. It forms on the leaves in such abundance that when they are dried and pounded it comes off in scales, and is collected and used as an article of food. When melted and strained in order to separate the crumbled leaves it is very delicious, and is eaten by the people often in preference to honey. In the summer it is collected in large quantities and put up for winter use.

Another kind of manna is also gathered in the Wilderness of Sin which appears to have more points of resemblance with the manna of the Israelites than either the edible lichen or the saccharine exudations above referred to. This substance exudes from the twigs of the tamarisk (*Tamarix gallica*), figs. 2–4, a shrub or tree which is distributed over a large part of the northern hemisphere, especially near the shores of the Atlantic and Mediterranean seas and those of West Asia and North-West India, but which only yields manna in the valleys of the Sinaitic Peninsula, such as the Wady El Sheikh, the Wady Feiran, Wady Gharundel and the Wady Taibe, this local variety being known to botanists as *T. gallica* (*mannifera*). In the Wady Feiran, the valley in which the Israelites are believed to have camped, and which leads from the Gulf of Suez towards Mount Sinai, the traveller passes through thick avenues of these trees, which are called by the natives "Turfeh" or "Tarffa" trees. They resemble a weeping-birch, and are especially rich in sap. The manna flows from the extremities of their slender pensile boughs in drops, described by Lepsius as sometimes as large as peas, sometimes no larger than pin-heads. The exudation was ascertained by Ehrenberg to be consequent upon the puncture of the *Coccus manniparus*, Ehr., a kind of scale insect or mealy-bug (fig. 6), which infests these trees in spring and summer, and which is allied to the cochineal insect *(Coccus cacti)*, and the *Coccus*

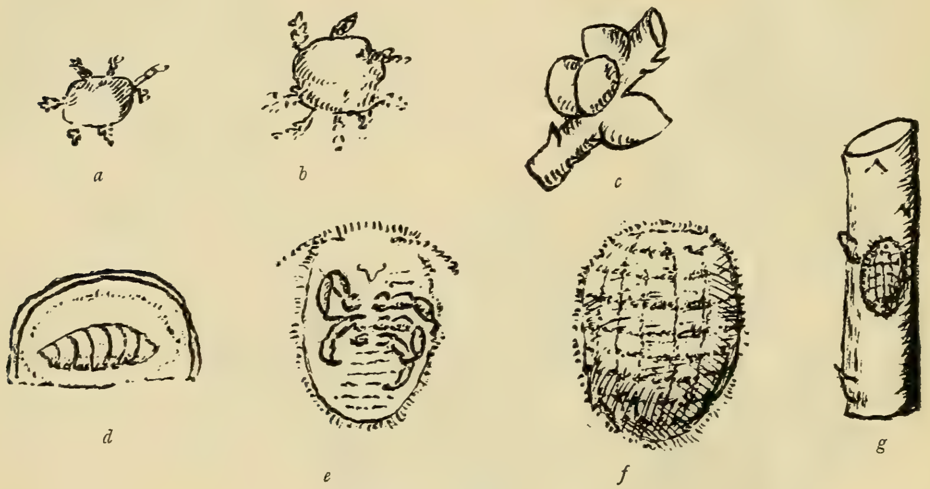



Fig. 6.—Coccus manniparus, Ehr.

*a* and *b*, drops of fallen manna; *c*, waxy vesicles, containing female pupa (magnified three times); *d*, section of vesicle containing pupa of female (much magnified); *e* and *f*, preliminary stage, underside and back (magnified thirty times); *g*, female (preliminary stage) magnified.

*ilicis*, of which the dye-stuff called "Kermes" is manufactured.

The gummy matter falls most plentifully in rainy seasons on the leaves and the ground beneath the trees (fig. 6), and when falling on clean rock is white as snow in colour. It soon hardens, but melts again (says the traveller Burckhardt) as soon as the sun shines upon it, so it is collected by the Arabs before sunrise, when it is coagulated. They clear away the leaves, dirt, etc., which adhere to it, boil it, strain it through a coarse cloth, and put it into leathern skins. In this way they preserve it till the following year, and use it, as they do honey, to pour on their unleavened bread and dip the bread into.

This substance corresponds in size, taste and colour, as also in the time and mode of its appearance and collection, with the manna of Exodus xvi. and Numbers xi. "We read" (says Carl Ritter, in his "Geography of Palestine") "that this food was provided after the Israelites had taken their journey from Elim and had come into the Wilderness of Sin, which is between Elim and Sinai, on the fifteenth day of the second month after their departing out of the land of Egypt. This seems to correspond with the Wady Taibe, the most northern point, according to Seetzen, where the manna (*Tamarix mannifera*) is found, and the time after the passage of the Red Sea coincides accurately with the season when it is first observed in the Wady Feiran."

It has been objected that very limited supplies of this manna are gathered in the present day, but travellers have recorded that the vegetation of the desert has been ruthlessly destroyed by the Bedouins, chiefly for the manufacture of charcoal, and we can be sure that in the time of the Israelites' wanderings the tamarisk extended in vast forests over the district where it is still found. The camel's-thorn was also no doubt much more abundant at that time than in the present day. Add to which, the yield of manna would be enormously increased if we suppose that the same winds which brought the quails in such profusion also brought an unusual quantity of the *Coccus* parasite, and that the trees were abnormally punctured.

It would be interesting to know the grounds upon which the learned author and editor of the "Natural History of Plants" have pronounced so decidedly in favour of the lichen, as it appears from the foregoing review of the subject that the food of the Israelites consisted, with a much greater degree of probability, of the exudation still known as manna, than of the dry and insipid lichen.

Some, however, may be inclined to think that the manna described with such exactness in the Scriptures was that of the tamarisk supplemented by the other sorts known to be common in the Sinaitic Peninsula.

## HINTS TO COLLECTORS.

It can never be too forcibly impressed upon those who are at all interested in the pursuit of scientific knowledge that one of the most absolutely essential features connected with the same is the keeping of a full and carefully-written record of their observations.

Among the multitude of facts nature teaches, it is impossible to long retain in the mind even the most pronounced details of any scientific object which may have come under our notice. The consequence resulting is, that when we wish to recall the facts associated with some object in our collection or relating to a peculiar phenomenon we have witnessed, we have only a meagre knowledge concerning it, if, as is too often the case, its data have not entirely slipped from memory. The forming of collections—no matter of what class of objects they may consist—is an altogether useless undertaking unless a carefully-compiled record is kept of their finding, and of facts relating thereto. It is not for the mere possessing of the objects themselves, however beautiful they may be, that we collect them, but that we may study them and learn their peculiarities.

Whether it is a flower or fern gathered for preservation, a fossil exhumed from the rocks, or an insect captured, all are devoid of lasting interest and of no service in the future unless a written record has been kept of the conditions when and where they were obtained. What a ruthless destruction of animal and more especially insect life exists amongst scientific collectors, or those who consider themselves as such, the greater portion of which might well be avoided if a little more attention were given to this most vital point. We often see collections of objects that would have been better left where they were in nature than collected in the manner I have indicated, and so rendered altogether useless; for if left, the possibility exists of their falling into other and more worthy hands, and perhaps scientific knowledge thus heightened and enriched. Whenever an object worthy of preservation is discovered, a note of the fact should be made in such a manner that its history can readily be found when needed, and the fuller the details given concerning it the greater service it may prove at some time in the future.

Needless to say, it is imperative that all observations should be accurate, especially in relation to dates and attendant conditions. It is best to make them at once and on the spot. The nomenclature and description of the object should be as accurately expressed as lies within the power of the observer, assistance in this direction being sought from all available sources. E. F. J. BRYAN.

*Bristol; December*, 1896.

# THE RISE OF PALÆONTOLOGY.

By Arthur J. Maslen.

(Continued from page 184.)

WHILE vertebrate palæontology was thus rapidly advancing under the guidance of Cuvier, Agassiz, Owen and others; the study of fossil-remains on the invertebrate side was making an equally rapid march under the guidance of Lamarck. Chevalier de Lamarck was born in Picardy in 1744, and, after relinquishing the Church, for which he was educated, and spending some time in the army, in 1773 began his scientific studies on the invertebrates. Working with Cuvier, he studied both living and fossil forms, and at the beginning of this century published works in which he classified the fossil with the living forms. He was quickly followed by others, some of whom adopted the Linnæan system of naming, while a section, unfortunately, did not. Among these we may mention James Parkinson, who, while practising medicine in Hoxton, tells us, in 1804, that: "Impelled by that eager curiosity which a view of a former world must excite in every inquisitive mind, I long and earnestly sought for information respecting these wonderful substances from every source to which I could obtain access." In time, after acquiring a "little fortune," he quaintly remarks that he "quitted the busy part of the world for ever," and published a great work in three volumes, well illustrated with beautiful figures, and entitled "Organic Remains of a Former World: being an Examination of the Mineralized Remains of the Vegetables and Animals of the Antediluvian World, generally termed Extraneous Fossils."

The Mosaic deluge was still regarded by many as the cause of the burying of the organisms which we now find as fossil remains—an idea which died but slowly. The celebrated Dr. William Buckland had, about this time, been promoted to the newly-endowed special readership in Geology at Oxford, and his inaugural address on this occasion was afterwards published under the title of "Vindiciæ Geologicæ; or, the Connection of Geology with Religion Explained"; while a few years later, as the result of a number of original researches on cavern deposits, he published his "Reliquiæ Diluvianæ; or, Observations on the Organic Remains in Caves, etc., attesting the action of an Universal Deluge." His work, as one of the earliest English practical geologists, was of much value, although of course his conclusions were warped to some extent by his particular theories, some of which he himself was lead subsequently to modify in the celebrated Bridgewater treatise on "Geology and Mineralogy considered with reference to Natural Theology."

In the Type Collections Gallery at the Natural History Museum, South Kensington, is to be seen a small collection which is perhaps the most generally interesting of all shown there to the student of geological history. It is that formed by William Smith, "the Father of English Geology," to whom we owe the first successful attempt not only to show that there is an invariable order of superposition of strata, but also that each formation can be recognized by the peculiar fossils which it contains, thus giving to fossils a geological significance in addition to the zoological one which they were already beginning to possess. No longer were fossils mere zoological curiosities; they were now, as Mantell called them later, "Medals of Creation."

Long and fierce had been the contest as to the agencies concerned in the formation of rocks. The two rival schools of thought—the Vulcanists who traced everything to the action of fire on the one hand, and the Neptunists, led by Werner, with their water theories on the other—had been silenced by the happy compromise of Dr. John Hutton, who maintained in his famous "Theory of the Earth," published at Edinburgh a little more than a century ago, that the stratified rocks owe their origin to the action of water; whilst the intrusive unstratified masses were the result of the action of heat. This was in truth the foundation of modern geology; but it was left for William Smith to show us how the stratified rocks can be made to tell the wonderful and fascinating story of the earth's past history, and the succession of steps by which the animals and plants of the present are linked with those of the past. William Smith was born at Churchill, a village in Oxfordshire, in 1769, and was the son of a small farmer and mechanic, who, however, died when the boy was at an early age, leaving him to the guardianship of an uncle, who apparently had but little sympathy with the boy, who would persist in collecting "pundibs" (Terebratulæ) and "quoit-stones" (Clypeus). However, he taught himself the rudiments of geometry and land-surveying, and in 1793 obtained an appointment to survey a proposed coal-canal near Bath. Here then were opportunities for geological work, opportunities which, when followed out, yielded to him the magnificent results we have mentioned, and stratigraphical geology, thus founded by an Englishman, remains to this day a division of the science in which Englishmen are in the front rank. In those days there were no societies devoted to geology through which

the scientific world might be made acquainted with the results of original research; so we find Smith taking his ideas before the local agricultural societies, where "Strata Smith," as he was nick-named, became a bore and a nuisance.

However, his ideas gradually became known and his conclusions accepted, and when, later, he went northwards into Yorkshire, he became acquainted with many a man who was destined to occupy a distinguished place in the galaxy of scientific worthies. Foremost among these may be mentioned John Phillips and the Williamson family. Prof. J. Phillips was a nephew of W. Smith, and had been busy collecting and describing the fossils of the mountain limestone district of Yorkshire, and published in two volumes (1829-1836) a most valuable work on "Illustrations of the Geology of Yorkshire," the types for which were afterwards bought for the British Museum, and brought up to Belle Sauvage. Burglars, however, carried them away as a prize, and we can imagine their disgust when, opening the box at the first convenient spot—on London Bridge—they discovered that their treasure-trove was but "stones," and, alas! they threw them over, and the priceless specimens were gone for ever.

It was Phillips who suggested the now familiar terms—Palæozoic, Mesozoic, and Cainozoic; while among his co-workers in Yorkshire were the Williamsons, father and son. The latter, W. C. Williamson, whose death but a year or two back we had to deplore, was, when Smith first made the acquaintance of the family, still a boy, but later, in 1835, he carried the principle of the identification of beds by their fossil contents a step farther by the recognition of district "zones," characterized by an assemblage of forms of ammonites, etc., having but short vertical range. Later he took up the study of palæo-botany, which had already been worked at in France by Adolphe Brongniart, by Count Sternberg in Germany, and by Lindley and others in this country, and by his researches on the "coal-balls" of the coal measures brought out the brilliant results on which our knowledge of the magnificent cryptogamic flora of the Carboniferous period is so largely based.

About this time (1838) a little society was founded by a few London geologists, which was destined later to develop into the Palæontographical Society, which has ever since undertaken the publication of all important monographs on this subject in this country. The original society, known as the "London Clay Club," consisted of Dr. Bowerbank, Searles V. Wood, Professor John Morris, Alfred White, Nathaniel T. Wetherell, James de Carle Sowerby and Frederick E. Edwards, and was originally formed to illustrate the Eocene Mollusca. Excavations at Highgate Archway and elsewhere had brought to light a large number of fossils, and already James Sowerby and his son, James de Carle Sowerby, had written and illustrated a great work, which was appearing in parts (1812-45), "The Mineral Conchology of Great Britain," consisting of six volumes, illustrated with 648 plates, representing with skill and fidelity the forms described, which were drawn from every geological formation and from every part of England. The work was carried on in great detail by the members of the Clay Club, and later the Palæontographical Society, the first volume, issued in 1847, being "The Crag Mollusca," by Searles V. Wood, the magnificent collection for which, occupying thirty years in its formation, is now deposited in the Natural History Museum, together with the Edwards collection of Eocene Mollusca, which represents the most complete collection ever attempted by any geologist, and which still remains unrivalled.

Our task is now completed. We have attempted to trace out, necessarily in a sketchy manner, the line of development of a branch of knowledge which, though in a strictly scientific sense, is such a new one that Cuvier and Lamarck may justly be called its founders and the present century its range in time, yet can be traced in an incipient form far back into the dim regions of antiquity.

The names we have mentioned are but a few among the long list of worthies whose works form landmarks by which the history may be traced; did space permit their ranks might be swelled by many whose claims to our attention are scarcely less important. Nor is it our intention in the present article to carry on the thread of our history up to the present time. We might point out the effects of the immortal genius of Charles Darwin (whose work has revolutionized the whole of modern thought, and not least the study of fossils), following in the wake of the great school of uniformitarianism, founded by Hutton, Lyell, Playfair and others. These have shown how wild were the dreamy speculations of the catastrophists, with their innumerable convulsions, cataclysms, inundations and special creations.

The development of the great idea of evolution in organic life has given a meaning to the succession of ever-differentiating types disclosed by the patient labours of Smith, Murchison, Sedgwick and others. Not only is the present the key to unlock the past, in the language of uniformitarianism, but the past has become a key by which alone we can understand many of the problems which confront us with respect to the existing forms. If we are to understand truly the full meaning and relationships of the existing animals and plants, we must know those of the past, now perhaps extinct, to

which they are genetically related, and from which they are the descendants.

In many groups of the animal kingdom there are known more extinct than living forms, while yet other great groups are known only by fossil forms. So great has been the evidence for evolution, for descent with modification, that the late Professor Huxley tells us that "The palæontological discoveries of the last decade are so completely in accordance with the requirements of this hypothesis that if it had not existed the palæontologist would have had to invent it."(1)

Yet we may feel certain that but comparatively few of the treasures locked up in the earth's crust have been discovered. North America has yielded to the patient work of Marsh, Cope, and others a large number of new forms noticeable alike for their profusion and their remarkable characters. Other regions are doing the same, and yet others may be expected to do so when diligently searched.

The end is not yet: the future may open up long vistas of thought and discovery, the effect of which may perhaps be seen in such a reaction between the present and the past as shall enable the biologist of the future, with his knowledge of organic forms and their succession, "to conclude from a part to the whole, . . . from one or two terms in such a succession to the whole series, and thus to divine the existence of forms of life, of which perhaps no trace remains, at epochs of inconceivable remoteness in the past."(2)

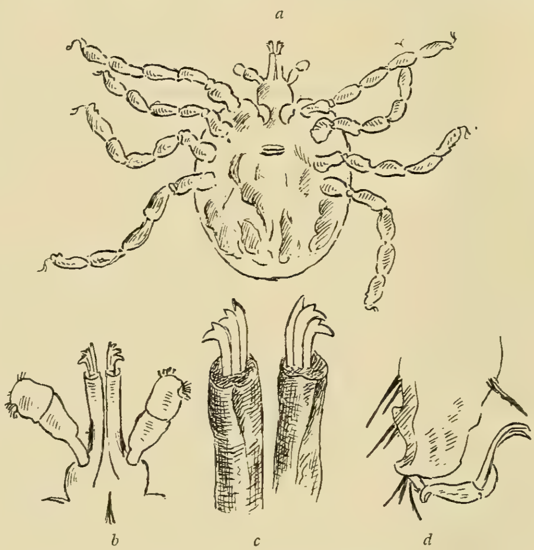
*Royal College of Science, London, S.W.*

(1) Collected Essays, vol. iv., p. 44.

(2) Collected Essays, vol. iv., p. 45.

## PARASITE OF TORTOISE.

IN April of last year I bought from a barrow-man in the street a small Grecian tortoise, attached to the hollow of the thigh of the hind leg of which I found a parasite that for a long time defied my utmost attempts to remove from its host. It was nearly the size of a sheep-tick (*Melaphagus ovinus*), and its head appeared to be entirely embedded in the flesh. Seeing there was no chance of capturing it alive I applied a drop or two of benzoline, and when dead the force necessary to detach it by the aid of a pair of forceps was such as to tear away a portion of the skin of the tortoise. This I had afterwards some difficulty in removing from the proboscis, for fear of damaging my specimen.



PARASITE OF TORTOISE.
*a*, drawn under 2" objective; *b*, head, 1" objective; *c*, lancets, ¼" objective; *d*, tarsus, ¼" objective.

Not having found a record of this animal in any book I have seen I made drawings, using a neutral tint reflector. These I enclose, and if you can make any use of them I shall be pleased.

The fleam-like lancets are admirable as instruments for piercing the tough skin of the tortoise, which, being accomplished, the double proboscis has the faculty of extension, exactly as one would open a pair of scissors. This fully explains the difficulty of detachment.

Turning from this diabolical-looking organ, one is struck with the extreme delicacy of the tarsi, both in structure and attachment. These appear to be loosely pendant, and can serve no other purpose than to help the creature to drag itself along the coarsely-wrinkled surface of the skin of its host. The antennæ, which have small tufts of hair near their extremities, lie backwards when the proboscis has completed its full insertion.

The finding of a parasite of this description upon such an inhospitable looking animal as the tortoise has been to me a very interesting discovery. I should be glad to know more about it.

SAMUEL HOWARTH.

26, *Grange Crescent, Sheffield*;
*January*, 1897.

# BIOLOGICAL JOTTINGS.

## PART II.—PARASITES.

BY RUDOLF BEER, F.L.S.

IN a former "jotting" (*ante* p. 173,) I pointed out the uncertainties which surround our ideas of the organic cell. In writing this second paper my thoughts were turned to a subject which was in everyone's mouth, and about the meaning of which there could be no dispute. Parasitism was the chosen theme. But, alas for my hopes! At the very outset, when I attempted to write down a definition, I found myself beset with more trouble and more confusion than even that chameleon term "cell" brought with it. After much reflection and much hesitation, Mr. Michael hazards the definition of an animal parasite as "a creature which, at the time spoken of, is residing in a permanent or temporary manner in or upon another living creature, and is existing at the expense of or by the assistance of the host."

Even this statement, which is perhaps as satisfactory as any can be, leads to strange issues. The sheep, living upon and at the expense of the grass of the meadow, is, from this point of view, undoubtedly a parasite. Moreover, the doubt arises that perhaps when we are enjoying a leg of mutton we also are parasites! We will pass, however, from such painful definitions to instances of what are commonly regarded as parasites. An example of the most virulent type of parasite is furnished by certain members of that all too familiar race, the bacteria. Another illustration is given by the Uredineæ, a class of fungi which play the same baneful part among the higher plants as bacteria do among human beings. It may not be unprofitable to look a little more closely at these fungi. A remarkable feature of these plants is the fastidiousness with which they select a host. Not only do they demand a particular species on which to grow, but many of them spend the different phases of their existence on distinct and special hosts. To gain some idea of their curious habits, we will glance at the life cycle of a common and representative member of the class.

The mildew of wheat will be familiar to everyone. Man's acquaintance with this pest dates back to very remote antiquity; in the middle ages Wycliffe mentions it, and Shakespeare speaks of the foul fiend who "mildews the white wheat." That some connection exists between this wheat disease and the barberry plant was recognized by farmers long before its fungoidal nature was understood. In fact, in 1760 an Act was passed in Massachusetts to effect the extermination of all barberry bushes, owing to the spread of wheat mildew.

The true nature of the disease of wheat and of the influence of the barberry plant upon it was first explained in 1818 by the patient and unobtrusive work of a Danish schoolmaster, Schœler by name. Finally the master hand of De Bary cleared up the remaining difficulties and set the whole story before us with limpid clearness from beginning to end.

Thanks to this brilliant work, we now know that the barberry itself is afflicted by a disease caused by a parasitic fungus of the class of Uredineæ. The spores produced by this fungus, strange to say, will not develop upon the barberry bush, but only upon wheat, and here they grow into a form quite different from their parent. Further, the spores of this second phase germinate upon fresh wheat plants to produce a different adult form from either of those which have gone before. From the resting spores produced by this third form a different generation is originated, the spores of which, falling upon a barberry, reproduce the stage with which we commenced. During the sojourn of this parasite upon the wheat the mildew of the cereal is caused. We see then that there are four stages in the existence of this organism: one of these is spent on the barberry, two on the wheat, and one is independent of a host plant. Truly, we may admit, this is a strange and complex life-history. It is a story too which is not peculiar to wheat blight, but one that is shared in a greater or less degree by all the members of that large group of parasites, the Uredineæ. For a long time each stage was looked on as a separate individual, but now the connections of the different forms are being gradually worked and understood. The name of "saprophyte" is given to those parasites which, although not attacking living organisms, are yet dependent upon their dead remains for sustenance. An example is furnished by *Xylaria hyponylon*, the candle-snuff fungus which grows on dead stumps of wood.

Besides these two degrees of parasitism connected with destruction and decay, there is also a third form in which nothing but good and advantage accrues both to host and parasite. I refer to the condition of symbiosis, which may be defined as a state of partnership entered into by two organisms for their mutual benefit, or, at any rate, if for the direct good of one alone, without the harm of the other. A very excellent example is furnished by the nodules on the roots of the leguminous plants. These tuberosities are crowded with micro-organisms which "fix" the free nitrogen of the air

and hand a portion of it over as a food-stuff to the higher plant. The latter, in return, gives some of the starchy food which its green leaves have prepared to the organisms in its roots. Thus the work of nutrition is, in this case, shared between two plants standing at opposite extremes of the vegetable kingdom. Any reference to symbiosis would be incomplete without a mention of the lichens. The work of Schwendener, of Stahl, of Reess and of others has shown that these plants are not self-standing, but rather to be regarded as fungi which have grown round and enclosed within them certain algæ. The relation existing between the two is not one of parasitism in the strict sense, however, but of symbiosis. Both fungus and alga have marked advantages from the combination. The colourless fungus is enabled to assimilate food; and it is rendered possible for the green alga to exist in situations which would be impracticable to it alone; moreover, the fungoidal covering protects the alga from many external dangers.

Another somewhat similar but less certain case of partnership is that which is said to exist between certain animals and algæ. The common *Hydra viridis* of our ponds represents a union of this kind. The body of the Hydra consists of an outer columnar layer of cells—the ectoderm—and an inner irregular layer—the endoderm,—between the two strata being interposed a delicate membrane—the mesoglœa. The inner endoderm cells abut upon the central cavity of the Hydra, and take a prominent part in the digestive processes of the organism. They are amœboid in their nature, constantly altering their shape; they are furnished each with a nucleus, a flagellum, and a large vacuole. Besides these things they have one other remarkable feature in that they are studded with granules of green chlorophyll. Now chlorophyll is the characteristic possession of the plant world, and it has been asserted that wherever this green pigment occurs in the animal kingdom it is present in the form of a low alga, which is included in the animal and stands in symbiotic relationship to it. Whether the chlorophyll grains of Hydra, Paramœcium, etc., are true organs of the animal in which they occur, or imprisoned algæ, is a question which can by no means be considered decided, although so careful an observer as Brandt is responsible for the latter view.

The illustration of symbiosis furnished by flowers and insects will be familiar to all. The pollination of the yuccas, a class of lilies, which Professor Riley has only lately (1892) explained, may be worth repeating here.

A moth, *Pronuba yuccasella*, when about to lay its eggs, flies to a newly-opened flower of yucca, pierces a hole into its ovary, and deposits its eggs in some six or more ovules. It then flies to the anthers and collects together a small mass of pollen which it stuffs into the hollow stigma of the plant. By all this it effects the fertilization of the flower at the expense of some few of its ovules, and at the same time it provides for the shelter and maintenance of its young. How dependent this plant is on the moth will be seen from the fact that in Philadelphia, where the moth appears when the yucca blooms, numerous seeds are formed, whilst in St. Louis, where the moth only comes after the time of flowering, no seed is developed.

In those countries where the leaf-cutting ant strips the higher plants of their foliage, a curious partnership is entered into between the ordinary ants and certain acacia plants. In *Acacia sphærocephala*, for instance, we find the thorns on the stem curiously hollowed out and opening on to the exterior by small holes. In these cavities the ants find a safe and convenient home. Not only does the plant house its visitors, but it also provides them with refreshments: from its leaflets it excretes small nutritious particles, which are eagerly devoured by the ants, and having taken off the edge of their appetites it tickles their palates still further with the nectar it secretes. Fortunate indeed are these ants beyond their fellows, and well should they deem their task a light one of repelling their leaf-damaging relatives. These latter themselves live under an even more curious symbiotic condition. The leaf fragments that they collect together they arrange as a pabulum for a certain fungus (*Rozites gongylophora*) which forms their staple food-supply. In order that this may be always to hand they plan those wonderful "fungal gardens" which Möller has so well described.

There is another case of comradeship between two animals which is well worth examining: it is the association of a certain hermit-crab (*Pagurus prideauxii*) and a sea-anemone (*Adamsia palliata*). The hermit-crabs, taken as a class, are curious in the possession of soft and unprotected tail-portions to their otherwise chitinous bodies. To protect this vulnerable organ the majority of them seek a whelk- or winkle-shell in which they can thrust this soft part, and in their travels drag the house they have appropriated after them. *Pagurus prideauxii*, however, is wiser than its brethren: in its young days it attaches itself to a very small shell, and to this habitat it sees that a specimen of a particular sea-anemone also becomes fixed. As the crab grows the shell only covers the tip of its soft and now large tail, and in the ordinary course of events it would have to undertake the unpleasant duty of house-moving. But in this particular far-seeing *Pagurus* the difficulty is obviated, for the anemone which became attached to this stolen house has, like the inmate, grown considerably; first it spread over the entire shell, then bit by bit it grew forwards beyond this on to the body of the

crab, and always as the latter increased in size the anemone kept pace with it. So it comes about that without the trouble of changing residences the crab is furnished with a covering to its tender abdominal region, and one that is far lighter and more easily carried about than the heavy whelk-shells of its near relatives. At first these smiled at brother *Pagurus* dragging upon him a double load, but now in later life the *Pagurus* can turn the laugh the other way. The anemone is soft, and might hardly, perhaps, be considered a sufficient protection, but its surface is studded with stings, by means of which it can drive away many enemies that even the hard whelk-shell might not satisfactorily keep off. The advantage to the anemone is of course obvious: in tearing up its food the crab lets many fragments slip by, and these are readily caught up by its partner. Again, the slowly movable anemone is borne rapidly from place to place not only away from external dangers, but also into "fresh fields and pastures new," where it can gather in abundant and varied diet.

In conclusion, we may turn to yet another instance of symbiosis in which man himself forms one link. Many micro-organisms, as we know to our cost, take up their habitation in the different organs of our bodies and produce in them various diseases. But micro-organisms are of many kinds, and by no means all harmful; some varieties reside normally in the body and gain, it is true, advantages for themselves, but give also advantages in return. Thus the intestinal portion of our digestive system is swarming with bacteria. The food that reaches this portion of the alimentary canal is acted on to some extent by the micro-organisms, which extract from it some parts for their own use, and in doing so aid in the chemical processes which collectively constitute digestion.

How far these bacteria share in the many changes of our food is not yet completely understood, but that they do take a share we fully realise, and some of the changes they effect we already know. The complete story of their work and the checks which the body exercises on their too rapid increase is still, however, a tale which the future must unfold.

Many and curious are the associations which we have seen between organism and organism, but none stranger than this last example, where, indeed, the extremes meet, and the simplest and the highest of organisms, the bacterium and man, join in the common issues of life.

*Elmwood, Bickley, Kent;*
*January*, 1897.

# SCALE INSECTS.

## Coccidæ Associated with Ants.

By T. D. C. Cockerell.

It is well-known to entomologists that ants' nests contain a varied and peculiar fauna, in addition to the ants themselves. These messmates and parasites are of many kinds, and a full list of them will be found in Wasmann's "Kritisches Verzeichniss der Myrwekophilen und Termitophilen Arthropoden," published in Berlin in 1894. Although the species enumerated in the work mentioned are very numerous, the subject is anything but exhausted, and will yield good results to the collector in any country. The present paper is intended to give a brief account of the Coccidæ known to be associated with ants, in the hope that some of your readers may be interested, and perhaps search for and discover some additional species.

(1) Margarodes formicarium, Guilding, 1833.

A very curious pearl-like yellowish creature found in and about ants' nests in the West Indies.

Roland Trimen has recorded a supposed *Margarodes* from ants' and termites' nests in Cape Colony. In Chile the ant *Brachymyrmex giardi*, Emery, is associated with *Margarodes vitium*.

(2) Orthezia occidentalis, Douglas, 1891.

About 4 millimetres long, oval, covered with white secretion, which is divided into lamellæ. Legs and antennæ comparatively large. Found in ants' nests in Colorado. For the full description, with figures, see Ent. Mo. Mag., 1891, p. 245.

(3) Spermococcus fallax, Giard, 1893.

This is a peculiar species found by Giard, at Wimereux, on the roots of various plants, especially grasses, in the nests of ants. The adult female is 5 to 7 millimetres long, by 2½ to 3 broad, yellowish fawn, primrose, with darker lines on the back. The antennæ are seven-jointed, the first three the longest. In June the female secretes cottony matter in which the eggs are deposited.

(4) Lecanopsis formicarum, Newstead, 1893.

Found by Mr. C. W. Dale, at Chesil Beach, in nest of *Formica nigra*; for the full description and figures see Ent. Mo. Mag., 1893, p. 206. The female is dusky-yellow or reddish-yellow, with two broad interrupted subdorsal stripes. Length, 5 to 5½ millimetres, breadth, 2 to 2½. Antennæ eight-jointed. It must be confessed that there is nothing in Giard's description of *Spermococcus fallax* which might not apply to this insect. It is true that the antennæ are said to be seven-jointed, but the

seventh joint is "très porlu et parfois subdivisé en deux." When Newstead wrote his description Giard's had not appeared, but Giard has a few months' priority of publication.

(5) EXÆRETOPUS FORMICETICOLA, Newstead, 1894.

Found by Mr. W. A. Luff in ants' nests in Guernsey. 2½ to 3½ millimetres long, sub-oval, more or less reddish-brown. Antennæ eight-jointed, slender, quite different from those of the *Lecanopsis*, last joint very small. Anterior tarsi two-jointed. For full particulars see Ent. Mo. Mag., 1894, p. 204.

(6) RIPERSIA TOMLINII, Newstead, 1892.

Discovered by Miss Tomlin (so it should have been called Tomlinæ) on grass roots in ants' nests, Moulin Huet, Guernsey (See Ent. Mo. Mag, 1892, p. 146, and 1893, p. 77.) It is associated with *Tetramorium cæspitum* in Guernsey, and with *Lasius alienus* in Alderney. Female, dull orange-yellow, elongate-oval, 2 to 3 millimetres long. Antennæ seven-jointed.

(7) RIPERSIA SUBTERRANEA, Newstead, 1893.

On roots of *Nardus stricta* in nests of *Lasius flavus*, in Norfolk. (See Ent. Mo. Mag., 1893, p. 79.) Female subpyriform, dark red-brown.

(8) RIPERSIA FORMICICOLA, Maskell, 1892.

Found by Mr. W. W. Smith, in New Zealand, in nests of *Monomorium suteri*, Forel, *M. nitidum*, Smith, and *M. smithii*, Forel. It had been reported to occur in the nests also of *Huberia striata*, but this was an error. Female, yellow, brown or red, flattish, circular or slightly elongated, powdered with white meal and having a number of white cottony tassels all round the margin. Antennæ six-jointed.

(9) RIPERSIA KINGII, Ckll., 1896.

Found by Mr. G. B. King, in Massachusetts, with *Lasius flavus*. Pink, shading into purple. Antennæ six-jointed. For the full account of this and the next two species, see Canad. Entom., September, 1896.

(10) RIPERSIA LASII, Ckll., 1896.

Found by Mr. G. B. King, in Massachusetts, with *Lasius americanus* and *L. flavus*. Clear white, antennæ seven-jointed, sometimes six-jointed.

(11) RIPERSIA FLAVEOLA, Ckll., 1896.

Found by Mr. G. B. King, in Massachusetts, with *Lasius claviger*. Light yellow, antennæ six-jointed, sometimes seven-jointed.

(12) DACTYLOPIUS KINGII, n. sp.

Adult female, oval, distinctly segmented, 3 millimetres long, 2 millimetres broad, very mealy, and covered with white cottony secretion. Colour (beneath the meal) a delicate pale pink; the internal juices are very bright pink. (Lately hatched larvæ are of the same colour as the adult.) Legs and antennæ, very pale brownish. Boiled in caustic soda the insects do not stain the liquid in the least. Antennæ eight-jointed, 8 much longest, very long, cylindrical, not at all swollen, with three whorls of hairs, it is longer than 6 + 7; 1 next longest; 2 and 3 equal, and neither so long as the breadth of 1 at base (1 is just as long as its basal breadth); 5 equal to 3. Formula 81(235)(67)4, but there is little difference between the joints from 2 to 7, except that 4 is very short, little more than half as long as 3. Mouth parts small; rostral loop barely reaching to base of middle legs. Legs ordinary, rather bristly, femur only moderately stout, longer than tibia. Tarsus about ⅔ length of tibia. Claw stout, curved; all the digitales filiform. Anal ring with the usual six bristles. Caudal tubercles practically obsolete, each with a bristle very little longer than that of the anal ring, and also some minute bristles, and two short, stout, conical spines. Discovered by Mr. G. B. King in nests of *Lasius claviger*, Rog., at Methuen, Massachusetts, Nov. 4th, 1896. The females, covered with their cottony down, look like little balls of snow in the nests, Mr. King says. Another lot of specimens is from *Lasius americanus*, *L. flavus* and *L. claviger*, Methuen, Haverhill, and Lawrence, Mass., all found by Mr. King. They occurred on the underside of the stones covering the nests. Specimens of this second lot show an antennal formula 8(12)3(567)4, and the claw has a minute denticle on the inner side; but I have no doubt they are the same species. This is the third truly native *Dactylopius* from the eastern United States. It resembles the other two (*D. trifolii*, Forbes, and *D. sorghiellus*, Forbes) a good deal, but is apparently distinct. A reference to a similar coccid, not identified, is given by McCook, Trans. Amer. Entom. Soc., 1877, p. 288. As it is described as dark red it is more likely to have been *D. trifolii* than *D. kingii*.

Several other species of *Dactylopius* have been found more or less associated with ants. In New Zealand, *D. poæ*, Maskell, and *D. arecæ*, Maskell, have been found wlth *Monomorium nitidum* and *Huberia striata*, but they are not strictly ants'-nest species. *D. poæ* is pink, with thin white meal; *D. arecæ* is yellowish-brown or reddish. Forel has recorded the ant *Brachymyrmex heeri*, Forel, as associated with *Dactylopius adonidum* and *Lecanium hemisphæricum*. In Trinidad, *Dactylopius nipæ* is tended by an ant, *Azteca chartifex*. In Michigan, Professor Davis found *D. trifolii* with *Lasius niger*; this *trifolii* is reddish-brown, with a mealy covering as in our insect, the antennal formula is 83(27)15(46), in the winter 8(35)2(1467).

POSTSCRIPT ON DACTYLOPIUS SORGHIELLUS.

It seems desirable to call more particular attention to the close relationship between *D. kingii*, described on page 242, and *D. sorghiellus*, Forbes. It is possible, indeed, that these two may ultimately prove to be forms of one species, though in the light of our present knowledge we must hold them distinct. The differences apparent on studying Forbes' description of *sorghiellus* are as follows: *D. sorghiellus* is covered by a bluish bloom, and does not hide itself in a white cottony sac like *kingii*; *sorghiellus* is 1⅗ millimetres long, *kingii* is 3 millimetres; in *sorghiellus* the fourth antennal joint is the shortest, as in *kingii*, but the eighth is "enlarged to a kind of club," while in *kingii* it is not at all swollen, and it is only "very nearly as long as the sixth and seventh together," whereas in *kingii* it is longer than these two. It might be thought that Forbes' specimens were not quite mature; but his notes show that he had adults, and he describes the eggs. As to the habits of *sorghiellus*, Forbes says it occurs "on corn (roots, leaf sheath and leaf), on sorghum (August 4th), and on the roots of June grass, timothy, and probably other meadow and pasture grasses, clover, and cocklebur (*Xanthium strumarium*). It is commonly attended by ants, especially the species most frequently acting as host to the corn-root aphis, *Lasius niger*, and its variety *alienus*. It sometimes passes the winter in their nests, where we have seen ants feeding on the waxy surface-covering of the mealy-bugs." (S. A. Forbes, Monog. "Insects injurious to Indian Corn," p. 107.)

(13) LECANIUM URICHI, *Ckll.*, 1894.

Discovered by Mr. Urich in Trinidad, in nests of *Cremastogaster brevispinosa*, Mayr. Found in Granada with an undetermined ant; also found in Brazil. About the size and shape of a half-pea, but somewhat smaller and flatter; red-brown, shiny, with black or blackish interrupted transverse lines. In Trinidad Mr. Hart found *Lecanium nanum*, Ckll., and *Icerya rosæ*, R. and H., in runs of the ant *Azteca chartifex*.

(14) LECANIUM FORMICARII, Green, 1896.

In Ceylon, on stems of tea and other shrubs, in nests of *Cremastogaster dohrni*, Mayr. Highly convex, almost globular, dull brown.

The above fourteen species are, I think, all yet known to be normally inhabitants of ants' nests. The list could be much extended if all those with which ants are associated were quoted. To give some examples: Mr. J. T. Moggridge describes how *Camponstus marginatus* at Cannes ascends the cork oaks in search of certain coccids, which from his description are evidently *Kermes bauhinii;* Mr. Douglas has recorded *Formica fuliginosa* guarding *Lecanium rubi;* Mr. Barber has found *Tetramorium auropunctatum* associated with *Lecanium hemisphæricum* on coffee in Montserrat; Mr. Sule found three *Phenacoccus aceris* in the runs of *Lasius fuliginosus;* the ant *Acropyga goldii*, Forel, was found by Dr. Goeldi tending a coccid on coffee-trees in Brazil; Mr. Schwarz found larvæ of *Aspidiotus perniciosus* on the ant *Monomorium minutum* in Virginia (the larval coccids will crawl on to anything that approaches, and so get transported from place to place); and at Las Cruces, New Mexico, the ant *Dorymyrmex pyramicus* attends *Icerya rileyi*.

(*To be continued.*)

## FEATHERED VERMIN IN THE PENTLAND HILLS.

By ROBERT GODFREY.

THERE is no need to explain the meaning of the word "vermin," except to say that it is here used in a rather restricted sense, being employed in reference to the feathered portion only of the malefactors embraced under that term. In the Pentlands we cannot boast a great variety of vermin, nor claim any rare breeding species. The three small hawks—the kestrel, merlin and sparrow-hawk,—long-eared owl, magpie and carrion crow, and, in some instances, jackdaw, constitute our list of resident vermin. But a few others pay a passing visit in spring and autumn.

Winter has barely passed before the keepers and shepherds prepare for their yearly onslaught on "hoodies" and hawks, and in their efforts to exterminate them, reckon every means taken as lawful and fair. Traps baited with fresh rabbit are laid down on the wood borders, and prove fatal snares for magpies and occasional kestrels and crows; unbaited traps are placed on poles on the hill-face, or laid on the top of a large stone by the streamside, chiefly with the view of snaring the dashing little merlin. And the gamekeeper is often abroad with his gun, skulking amongst the trees in search of the various objects of his aversion. In spite of the number of birds annually killed, fresh arrivals and birds that have escaped a previous persecution are sure to turn up in the following season, and the number of vermin always seems well up to the average as spring comes round. The predominating species vary in different regions of the hills, and whilst one or the other may be common in certain localities, it may have been in others almost exterminated. The magpie forms the

most striking instance of the truth of this remark, being quite unknown or occurring as a very rare straggler in some districts, and in others positively swarming. Wherever game is protected, the magpie becomes one of the chief objects of the keeper's pursuit. During March and April trapping and shooting do their work fairly well, but not so successfully as to allow of the keeper's resting content. Many birds that have escaped his attention and are then nesting have to be sought for and destroyed, as every hawk in most keepers' eyes, and every owl in many, lives only to be the enemy of game.

The first nest reported during the past season, 1896, was a carrion crow's in course of building, on March 20th. The crow or "hoodie" is perhaps the most disliked of all feathered vermin, and he is also the most successful at eluding destruction. The crow is a common breeding species on the hills, nesting in solitary trees by the burnsides as well as in clumps of trees and in larger woods, and by his cunning he often successfully escapes destruction. Yet he is the main cause of the mischief which so angers the keeper. In spring and summer he varies his carrion diet with eggs, and many a nest of the red grouse he harries, sometimes carrying the eggs to the neighbourhood of his own nest, but often enough sucking them on the spot. In the case of the carrion crow, at least, we must side with the keeper. Can anything be more irritating to him than to see a wood strewn with grouse eggshells? In the nesting season almost every wood yields at least one crow's nest, and in many cases a wood may be repeatedly visited without the occupied nest being discovered. To obviate loss in such instances some keepers destroy by shot every large nest in the wood, and thus make sure of preventing the escape of young birds. The northern ally, the hooded crow, does not breed in this area, but occasionally appears in April, and again in autumn. I saw one on October 28th last, soaring in company with a carrion crow above one of the woods. The raven is still rarer, but is met with at intervals, and one was reported to me during the recent autumn from the eastern flank of the hills.

Our commonest hawk is the kestrel, a sadly persecuted bird, and one of whose merits it is exceedingly difficult or impossible to convince the keepers. The kestrel generally reveals the secret of her nesting-place by squealing in the presence of an intruder, and too often brings about her own destruction; occasionally, however, she acts differently. One of the likely nesting localities noted in spring was in a haunt at which a pair was shot in 1890, and it was expected that the jackdaw's nest occupied on that occasion would be tenanted again; this particular nest, however, remained empty, and the silence that reigned on subsequent visits led us to consider that the kestrels had shifted their quarters. Late in May, however, my brother and a party were exploring this district, and caught the kestrel sitting on six eggs in a hole not a stone's throw from the former site. Two days afterwards I visited the spot and found the eggs warm, but neither saw nor heard the kestrels. The birds, however, kept their charge in safety, and later in the season my brother took five young birds from the hole to rear as pets.

The merlin is less common and more decidedly local than the kestrel, and generally nests by the sides of the small heather-clad gullies. On the last day of April, a gamekeeper directed me to an open wood clump where a pair of hawks were evidently intending to nest, and on approaching the wood I was greeted by the squealing of a pair of merlins as they flew above the trees. I found a number of crows' nests in the wood, and had rather a gloomy prospect in looking forward to climbing all of them during a shower of rain in search of the merlins' eggs. I kept my attention on the birds however, and presently observed one of them hover above a tree and pass on, and I suspected that the nest above which the bird had hovered would be the chosen nest. When the rain abated I climbed the tree and found the nest empty, but clean, with the accumulation of pine needles. On May 9th I returned, and entering the wood cautiously, clapped my hands and saw the hawk leave this very nest. I again climbed, both merlins squealing wildly around. The nest contained two eggs, and both birds kept careering in wide circles around and above the wood and occasionally alighted on the tree-tops during my stay. On the 15th the keeper shot the hen merlin off the eggs and sent me a note. I visited him on the 18th, and went with him to the nest again. The male had kept by the nest for two days after the hen had been shot, but he had escaped the keeper's attempts on his life and had now forsaken the nest. On climbing for the third time I took the four eggs, and examining the nest carefully, I found in addition to the clearing out of all rubbish an apparent interlacing of a few additional twigs on the border of the nest, which must have been the work of the merlins.

A few days afterwards a second merlin's nest was found amongst the heather—the usual site—in a different part of the hills; the eggs were taken, but the birds escaped. In the case of a third merlin haunt occupied yearly, I was not able to find out the fate of the birds during the past season. Merlins are less commonly met with in winter on the hills, but a hen was shot on December 5th last, near one of the local haunts.

On the hills proper the sparrow-hawk is rare, but this species also appears in pairs about particular woods at the approach of the breeding

season. I was especially anxious to procure a nest of the sparrow-hawk last season, and asked the keeper to send me word should he meet with one. He shot the only pair seen on his ground early in the season, and as the summer advanced without any others appearing he naturally inferred that he had no sparrow-hawks in his territory. Late in the summer, however, one of his sons came in with the startling information that a brood of young hawks were flying about in a wood not far from the house, and without any delay he went out and shot them. I was not able to visit the spot till October, and I then noted the particulars of the sparrow-hawk's nest. It was situated in a Scotch fir, about fifteen feet from the ground, on the border of a low wood, and was supported between several stout branches; in bulk it appeared midway between a cushat's and a crow's. The nest was clearly the work of the birds themselves, and was formed wholly of twigs, and lined with flakes of fir-bark, sodden by the repeated rains. Many legs of birds and other portions of skeletons lay on the nest, or were entwined amongst the sticks, and one good specimen, with skull, neck and back vertebræ and legs complete, showed the powers possessed by the hawks of cleaning their victims. In this latter case the skull was broken but not severed from the neck—a fact which I thought highly interesting in conjunction with the usual habit in birds of prey of tearing off their victims' heads.

Owls fare somewhat better than hawks in our area, though they too have their enemies, and offer easy marks for destruction when persecution is directed against them. The long-eared owl is the only common species on the hills, and is generally found frequenting open clumps of woodland; the tawny owl is abundant enough in the policies skirting the hills, but does not as a rule inhabit the small open fir-woods. In autumn, the short-eared owl is occasionally met with amongst the heather. In early summer four localities were noted as occupied by the long-eared species, and in the two instances where the nests were found, an old magpie's had in each case been chosen. One of these proved interesting as being the same nest that had been occupied and robbed in the previous season, and it would have escaped scrutiny on this occasion had not one of the young fallen out of the nest and attracted the keeper's attention as he passed through the wood. At the first opportunity I climbed the occupied tree and found the two downy youngsters sitting head to tail, their bright golden eyes making them appear much smarter little fellows than do the dark, watery-looking eyes of the tawny owl. Somewhat later in the season I climbed again and found the young owls in a defiant attitude; one of them to prevent capture got over the edge of the nest, but, being unable to fly, was easily driven to the ground, and its companion was taken down in my pocket. On the ground the young owl ruffled its plumage and spread out its wings in a rounded manner and sat like a defiant turkey, ready to resist all attacks, and kept chuckling constantly the while. One of the birds died after a few weeks' captivity, but the other is still thriving beside four kestrels; he never quarrels with them, and even allows them by day to take out of his bill without any remonstrance pieces of flesh that have been given him. As night draws on he becomes lively and utters a low, peculiar call to hasten my visit, and as soon as he sees me coming he spreads out his wings till he appears four or five times his real bulk, and lowers his head in readiness to pounce on a mouse or a piece of beef as soon as I present it, but after being fed he resumes silence.

The species included in the keeper's vermin list afford to the lover of nature some of the most interesting studies in our native wild life, and they ought not to be ruthlessly subjected to persecution as they are, especially as, in the case of the kestrel and the owls, the birds do more good than harm.

46, *Cumberland Street, Edinburgh;*
*January 7th*, 1897.

A Whale at Boscombe. — A correspondent writes: "Private enterprise, especially when directed in the cause of Science, deserves a better fate than befell Dr. Simpson, of Bournemouth. Buying a whale, in his case, proved a very serious matter. A dead whale, measuring 65 feet in length and 24 feet in girth, and weighing nearly 40 tons, was washed ashore at Boscombe early in January. On investigation it was proved that the death of the huge creature was due to having its back broken, in all probability by contact with some vessel in the open sea. The carcase, believed to be the largest ever landed on the local coast, was sold by auction at the instruction of the Receiver of Wrecks. The sale attracted a large number of persons. The bidding was not very brisk. The opinion was that the Bournemouth Town Council would themselves purchase the carcase with a view to having it preserved in a local museum, but unfortunately there is no such institution at present in the town, so the bidding was left to private individuals, and the whale was knocked down to Dr. Simpson, of Bournemouth, when the bid had reached £27. But the creature soon brought trouble to the doctor. The removal of the skeleton from the beach, so as to provide for its permanent preservation, did not prove so easy as the buying, and before any attempt could be made for its removal the whale underwent changes that made the carcase a nuisance to the town, so much so that the sanitary authorities bestirred themselves. Dr. Simpson will in all probability be anxious to forget the incident; at any rate he deserves forgetfulness of the offending carcase, whilst it remains to be hoped that its scattered bones will be brought together as a complete skeleton for the benefit of posterity."

# ARMATURE OF HELICOID LANDSHELLS.

By G. K. Gude, F.Z.S.

(*Continued from page 207.*)

PLECTOPYLIS *cyclaspis* (figs. 34*a-d*), from Tenasserim, Burma, was first described by Mr. Benson, under the name of *Helix catinus*, in the "Annals and Magazine of Natural History" (3), iii. (1859), p. 185, but that name being preoccupied in Helix he changed it to *Helix cyclaspis* (loc. cit., p. 273). Having received additional material, which enabled him to examine the armature, he subsequently published an amended description (loc. cit. (3), v. (1860), p. 245). The shell was first figured in Hanley and Theobald's "Conchologia Indica," t. 13, f. 10 (1870). The anatomy has been figured by Mr. F. Stoliczka in the "Journal of the Asiatic Society of Bengal," xl. (1871), p. 222, t. 15, ff. 4-6, and by Mr. Pilsbry in "Manual of Conchology, ix. (1895), t. 42, ff. 34-36, while the palatal armature has been illustrated by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society," 1874, t. 74, f. 10. The shell is sinistral, depressed-conical, widely umbilicated, irregularly ribbed above, smoother below, hornish brown, with the suture margined; it is composed of six and a-half or seven slowly increasing whorls, the last not descending in front, and having an acute, compressed keel. The peristome is thickened and reflexed and its margins are united by a raised straight ridge; the parietal callus bears a short, strong horizontal entering fold, entirely visible from the aperture (see fig. 34*a*). The parietal armature consists of a strong and very complicated ramified plate, which ascends obliquely from the side of the aperture near to the suture, where it bifurcates, one arm—the upper one—ascending a little, then proceeding horizontally, and finally becoming attenuated; the lower and stronger one descends obliquely at an angle of 45° for about half its length, then deflects almost vertically and gives off posteriorly at its base a short strong support. The lower extremity of the main plate gives off anteriorly also a strong short support. Below the plate is a free, short, horizontal fold. The specimen shown with the outer wall removed in fig. 34*b* is not quite mature, and it possesses the former plate, which is evidently in course of absorption, as the second descending arm has almost disappeared, and the lower free fold is also very slight. The palatal armature consists of five folds: the first, thin, near and almost parallel with the suture; the second, broad and flexuous, descending obliquely posteriorly, half above and half below the peripherial keel; the third, also broad and somewhat crescent-shaped; the fourth, very strong, broad and vertical, and intercalating with the main stem and lower branch of the parietal plate; the fifth, thin, horizontal and parallel with the lower suture. Fig. 34*c* shows the parietal and palatal armature from the anterior side, while 34*d* shows the inside of the outer wall with its palatal folds. At the base of the vertical palatal fold on the right side—*i.e.* posteriorly—occurs a small denticle, shown erroneously in fig. 34*d*, on the left side. Fig. 34*a* shows a mature specimen, natural size; the other figures are all magnified. The two specimens are from Moulmain, Burma, and are in the collection of Mr. Ponsonby. The mature specimen measures—major diameter, 17 millimetres; minor diameter, 14.5 millimetres; axis, 7 millimetres.

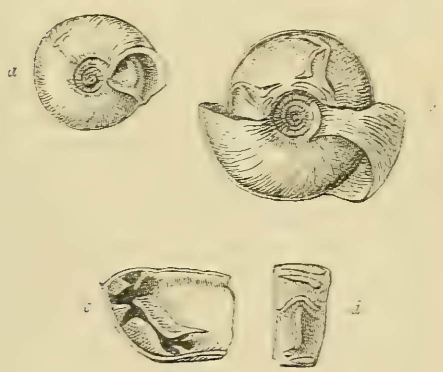


Fig. 34.—*Plectopylis cyclaspis.*

*Plectopylis karenorum* (figs. 35*a-d*), from Pegu, was described by Mr. W. T. Blanford in the "Journal of the Asiatic Society of Bengal," xxxiv. (1865), part 2, p. 73, and figured by Dr. Pfeiffer in "Novitates Conchologicae," iii. (1869), t. 108, ff. 16-18, and in Hanley and Theobald's "Conchologia Indica," t. 13, f. 6 (1870). The armature was figured by Lieut.-Colonel Godwin Austen in the "Proceedings of the Zoological Society," 1874, t. 74, f. 5. According to Mr. G. Nevill ("Handlist of Mollusca in the Indian Museum, Calcutta" (1878) p. 72), the species has also been found in the Arakan Hills. The shell is sinistral, disk-shaped, with the apex a little raised above the flattened spire, with a wide but shallow umbilicus, white with light chestnut strigations, finely ribbed, with microscopic spiral sculpture. It is composed of six closely-coiled whorls, which increase slowly, the

last being a little wider than the preceding, angulated above the periphery and descending anteriorly. The peristome is white, somewhat thin, but reflexed; the parietal callus has a raised flexuous ridge, separated from the lower margin of the peristome and notched at its junction with the upper margin. The parietal armature consists of a long horizontal fold, united to the ridge at the aperture, and proceeding parallel with the last whorl for a quarter of its length, at which point it

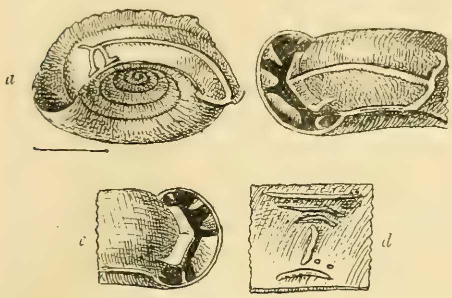



Fig. 35.—*Plectopylis karenorum.*

gives off a shortly descending arm; it then rises obliquely for a short distance and finally bifurcates, the lower arm of the bifurcation being the longer, and obliquely descending, while the upper arm is slightly curved backwards; the single arm first mentioned has posteriorly at its lower termination a short obliquely descending ridge, and a little higher up anteriorly a stronger obliquely ascending ridge, while the lower arm of the bifurcation has posteriorly at its lower termination a short obliquely descending ridge, (see fig. 35*a*). Below this complicated plate there is a free, thin horizontal fold close to the lower suture, also united to the ridge at the aperture (see also fig. 35*b*, which shows both armatures from the side of the aperture, and fig. 35*c*, which gives their posterior view). The palatal armature consists of: first, a thin and long horizontal fold parallel with and near the suture; secondly, another thin but shorter fold which at first proceeds horizontally, then suddenly deflects posteriorly with a slight curve backwards, a small denticle occurring posteriorly in a line with the main horizontal portion; thirdly, a short, somewhat stouter, crescent-shaped fold, with its concave side facing the aperture and lower suture; fourthly, a strong vertical fold, with two minute denticles posteriorly near its lower end; and fifthly, a thin horizontal fold, slightly reflexed in the middle (see fig. 35*d*, which shows the inside of the outer wall). The specimen figured is in the collection of Mr. Ponsonby; it measures 13·5 millimetres in diameter.

In looking over the specimens of *Plectopylis* of the McAndrew collection in the University Museum of Zoology, Cambridge, I found three specimens labelled *Plectopylis burmani*, Benson, doubtless a misspelling for *P. burmanica*, one of Mr. Benson's MS. names. On comparing them with *Plectopylis karenorum*, I found them to belong to that species. As I have reason to think that *P. karenorum* exists in some collections under the name of *P. burmanica*, and as, moreover, this MS. name was never, to my knowledge, published by Mr. Benson, I have thought it useful to make mention of the above fact.

*Plectopylis laomontana* (figs. 36*a-c*), from Laos, was described by Dr. Pfeiffer in the "Proceedings of the Zoological Society," 1862, p. 272, and figured by him in "Novitates Conchologicae," ii., t. 57, ff. 7-9 (1863). It was also figured in Mouhot's "Travels in the Central parts of Indo-China (Siam), Cambodia, and Laos," ii. (1864), figs. 9 and 10. As the armature has not hitherto been figured, I am pleased to have had the opportunity of doing so. The shell is solid, disk-shaped, with the apex scarcely raised above the flattened spire, chestnut brown, finely ribbed above, smoother below, with scarcely any trace of spiral sculpture. It is composed of six or six and a-half whorls, the last of which widens rather suddenly, descends abruptly and shortly in front, and is slightly constricted behind the peristome, which is whitish, thickened and reflexed, and has its margins united by the raised, slightly curved ridge of the parietal callus, but a little notch occurs at the junctions above and below. The parietal armature consists of a single strong, solid lunate plate, with its concave side facing the aperture, and deflexed posteriorly below. (See fig. 36*b*, which gives the posterior view of both armatures.) The palatal armature consists of: first, a short horizontal fold near the suture; secondly, a stouter

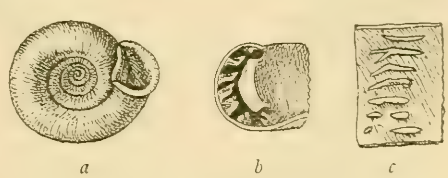



Fig. 36.—*Plectopylis laomontana.*

and somewhat longer horizontal fold, shortly bifurcated posteriorly, the upper arm proceeding horizontally, and the lower and shorter one descending obliquely; thirdly, a shorter stout fold which proceeds at first nearly horizontally, then deflects a little about the middle, the anterior half being a little indented; fourthly, a short, stout, straight fold, descending a little obliquely posteriorly, and also a little indented in the anterior half; fifthly, another straight, short, stout fold, also

descending a little obliquely posteriorly, strongly indented in the middle; sixthly, two short, stout, slightly oblique folds, the posterior a little higher than the anterior one; seventhly, a short and thinner horizontal fold near the lower suture, with an elongated tooth a little above (see fig. 36*c*, which shows the inside of the outer wall with its palatal folds). The large form of this species, which is regarded as the type, I have been unable to obtain; it is said to measure 32 millimetres in diameter, and to show all the palatal folds through the shell-wall. A small variety, stated by Dr. Pfeiffer not to show the palatal folds externally, measures 21 millimetres. The specimen figured, which is from Louang Prabang, Laos, measures 19 millimetres in diameter, and does not show the folds through the shell; it is in Mr. Ponsonby's collection. A specimen in my collection, however, measuring 21 millimetres, distinctly shows the folds through the shell-wall.

*Plectopylis brachyplecta* (figs. 37*a-f*), from Moulmain, was described by Mr. Benson in the "Annals and Magazine of Natural History," (3), xi. (1863), p. 319, and figured in Hanley and Theobald's "Conchologia Indica," t. 57, ff. 7 and 10 (1870). The armature was figured by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society, 1874, t. 74, f. 8. The shell is disk-shaped, widely umbilicated, dull-reddish chestnut, with

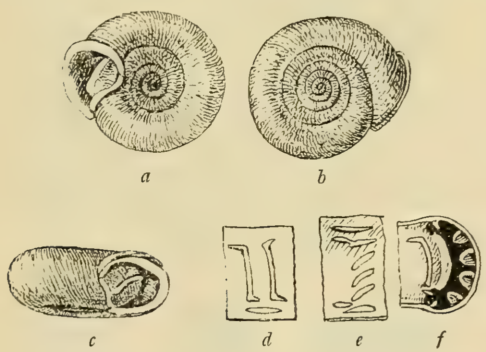



Fig. 37.—*Plectopylis brachyplecta.*

amber-coloured apex, paler below, finely and regularly ribbed, and decussated by minute spiral sculpture. It is composed of six or six and a-half more or less convex whorls, which increase slowly, the last being rounded and subangulated above, near the suture, and shortly and abruptly descending in front. The aperture is ear-shaped, and the peristome brown, strongly thickened and a little reflexed, its slightly converging margins being joined by a thickened curved ridge, which is slightly notched at the junctions above and below. A strong entering flexuous fold is given off from the parietal ridge, revolving over less than a quarter of a whorl. The parietal armature further consists of two strong, vertical, slightly curved parallel plates; the anterior one has a short horizontal support posteriorly below, and a strong horizontal ridge anteriorly above; the posterior one gives off on the posterior side two short supports, one above and one below. A short, free horizontal fold occurs below the vertical plates. Fig. 37*d* shows the parietal wall with its plates and the fold, while fig. 37*f* gives the anterior view of both parietal and palatal armatures. The palatal armature consists of: first, a thin horizontal fold near the suture; next, four short, broad, oblique, nearly parallel folds, whose lower concave sides face the aperture; finally, a short thin horizontal fold near the lower suture. A little above the second fold and united to its posterior extremity occurs a very short straight fold, while another short, slight oblique fold is found between the posterior ends of the fifth and sixth folds. (See fig. 37*e*, which shows the inside of the outer wall with its palatal folds.) Figs. 37*d-f* are drawn from one of the type specimens from Moulmain in the McAndrew collection of the University Museum of Zoology, Cambridge, the shells having been lent for this purpose by Mr. S. F. Harmer, the Superintendent. It measures—major diameter, 22 millimetres; minor diameter, 18 millimetres; axis, 8 millimetres. Among the shells of the genus *Plectopylis* in the British Museum, I found two specimens in the Theobald collection, labelled *Plectopylis clathratula*, Benson, from Balcadua, Ceylon. I am not aware that Mr. Benson ever published this name, but Dr. Pfeiffer described a species belonging to a different section of the genus, from Ceylon, under that name. As no species of the section to which these three shells belong has ever been found in Ceylon, it is probable that there is a mistake in the locality, and it is certain that the name is wrong. Judging from the external resemblances to *Plectopylis brachyplecta*, I suspected that these shells would prove to pertain to that species, and having obtained permission from Mr. Edgar Smith, the Assistant Keeper, to open one of the shells, I was enabled to confirm my suspicion, for the armature proved to be identical with that of *P. brachyplecta*. One of these specimens is shown in three different positions in figs. 37*a-c*. It measures—major diameter, 22 millimetres; minor diameter, 18·5 millimetres; axis, 8 millimetres.

(*To be continued.*)

ERRATA.—Lieut.-Colonel Godwin Austen has kindly drawn my attention to the following errors: p. 205, second column, fifth line from top, for Henozdan, read Hengdan; eighth line from top, for Kopameda, read Kopamedza. He also states that the locality given for Mr. Ponsonby's specimen of *Plectopylis serica*, Sylhet, is impossible, as these species are very local, and one found on the summit of a range of 5,000 feet and upwards is not likely to occur in a country like Sylhet, only just above the level of the sea.

# NATURE NOTES IN THE RIVIÈRA.

By John T. Carrington.

THE Riviera, like most other parts of the northern hemisphere, is susceptible to considerable variation of atmospheric conditions in different seasons. The Riviera of southern France, and also of northern Italy, is a narrow strip bordering the shore of the Mediterranean, extending from a little east of Marseilles as far as Genoa. It occupies the space between the high hills which terminate the different ranges that constitute the southern spurs of the Alps. As a rule the climate is remarkably equable; but the past two winters have been notable, the one for extreme dryness, the other for unusual wetness. The winter 1895–6 was characteristic until the last week in December, when fine sunny weather commenced, and lasted almost without intermission until the following August. This winter has been exceptionally rainy, although there was, up to the middle of December, many of those deliciously fine days which remind one so much of early June in England. Since then there have been some on which the rain has fallen with tropical intensity, filling the usually dry torrent beds which come down to the sea from the Maritime Alps.

I arrived at Marseilles about the middle of October and spent some little time in the neighbourhood. For the botanist, the malacologist, entomologist, and indeed the student of natural history generally, the district surrounding that large city affords many opportunities for research. So far as I could discover there are unfortunately but few amateur naturalists in the district. This is the more unexpected as I know of few cities in Europe possessing so fine a museum of natural science objects, where students may compare their captures for nomenclature or otherwise. This museum occupies the right wing of the Palace which was presented to the city some time ago by the Empress Eugènie. It is admirably arranged, well lighted, and bears evidence of the fostering care of a clever curator. The great feature for the amateur in this museum is a beautiful and extensive collection of natural history subjects typical of the marine and terrestrial fauna and flora of Provence, which literally represents the littoral of Mediterranean France. This collection occupies a very large room, and by its aid any collector may identify species which present difficulties to him. Should he be unable to do so he will find polite attention from officials in charge, so that it must indeed be something exceptional to defy their united experience.

The collection of landshells in the local collection at Marseilles is only equalled by that of the marine species. In the former will be found liberal series of all southern French species containing a large number of varieties and some curious monstrous forms. What strikes one immediately on seeing some of these is the large size to which several species attain. For instance, among examples of *Helix aspersa* found in the neighbourhood of Marseilles are specimens as large as some that occur in Algeria.

Any visitor to the Riviera interested in natural science should not fail to break the journey at Marseilles, for at least a day, so as to examine this fine collection. Should it happen on the visit that the museum is found to be closed, no difficulty will be encountered in obtaining admission by applying at the house of the concièrge, which will be found at the right-hand corner of the basement. While writing of this museum, two or three others in the Riviera may be mentioned. There is one of natural history at the museum in Toulon. I have not had an opportunity of visiting this establishment for four or five years, when it was only just opened and very incomplete. The museum at Cannes is at the public offices of the town, where there is also a small collection of local animals. Among landshells of the region are several good series, especially notable being some immense specimens of *Helix pomatia*, which exceed in size any I have previously seen. The curator informed me that these were found in the neighbourhood of Grasse which lies inland some few miles north of Cannes.

At Nice there is a compact little museum, which has become the property of the city through the gift of a gentleman, who died on November 5th last, at the age of seventy-nine years. He was M. Jean Baptiste Barla, a gentleman of private means. Born at Niçois, he lived all his life in the neighbourhood of that city. He was a botanist, possessing an exceptional knowledge of the plants of the Department of Alpes Maritimes and the adjoining Department of Var, the Principality of Monaco and western Italy. His herbarium, which is now at the museum, is considered to be a nearly complete representation of the plants of both the French and Italian Riviera. The series of each species contain a large number of specimens for comparison from other regions, including Algiers and other parts of North Africa, as well as Corsica, Sardinia, Sicily, Spain, Italy, etc. This herbarium contains about two thousand species of flowering plants, which are in good condition and well arranged. The curator of the museum is M. J. Olivier, who is himself an excellent botanist. He

gladly shows any species, family or natural order which is desired for comparison or examination.

The leading feature in the Nice Museum is the magnificent collection of upwards of 700 groups representing life-size models, no less than 3,000 in number, of more than 500 species of fungi found in the immediate neighbourhood of Nice. These are all constructed of plaster of Paris from moulds made from original specimens, and coloured with life-like accuracy. This collection, which took thirty years to complete, was made entirely unaided by M. Barla above referred to, who was also an excellent cryptogamic botanist. It is, I believe, unique as a collection, and cannot be too widely known. I understand from M. Olivier that M. Barla identified no less than 2,000 species of fungi in the Department of Alpes Maritimes. The Nice Museum contains also collections of birds, fish, shells and other animals. The shells will probably be re-arranged and cleaned before long, as they do not appear to have been recently overhauled. The rarest shell we observed in the collection was *Bulimus labio*, a scarce Peruvian land species. Among recent additions we noticed a fine example of the uncommon sea-shell, *Mitra zonata*, of Swainson, which is preserved in spirit, with the animal protruding to some extent from the shell. This was found, in June last, by fishermen in deep waters some little distance south of Nice.

It may be interesting to remark that the museums above referred to are free of admittance, and, generally, open to students by special application, even during hours when closed to the public.

*Nice; January 1st, 1897.*

*(To be continued.)*

Kingfisher in the Hebden Valley.—Mr. J. Needham, of Hebden Bridge, reports in the "Halifax Naturalist" that a pair of kingfishers were seen in Hebden Valley, about Lee Mill, for a week or two, but unfortunately people with guns saw them, and one was shot. Some years ago the kingfisher was rather abundant about Lee Mill and Dog Bottom, but of late appears to have grown almost extinct. A new fishing club has recently been started which has stocked the river with trout, and Mr. Needham thinks this has probably attracted the kingfisher.

A Killarney correspondent states that the fishing of the Killarney Lakes has been seriously damaged, if not ruined, by the recent bog slide at the Quarry Lodge. The close season terminated on January 16th, and never before has the fishery opened under such unfavourable auspices, the "takes" on the three lakes amounting to only seven salmon. The weather in the first place was not favourable, and the lower lakes are discoloured by the boggy débris conveyed into it by the Ownacre and Flesk rivers, and until this disappears prosperous fishing cannot be hoped for.

## ABNORMAL SCABIOUS.

The abnormal flower of *Scabiosa arvensis*, a sketch of which, on scale of one-half natural size, I send you, was found some years since in a cornfield, and although diligent search has since been made for another such specimen, it appears to be unique, at any rate as far as my experience goes. It also appears to be as good an illustration as is often found of the claims of some writers as to

Abnormal Scabiosa arvensis.

composite flowers having originated from simpler forms for the purpose of becoming more attractive to insect visitors. If this is the case, is not the single floret in its separate involucre and on a separate stalk at some little distance below a full-sized and perfectly normal flower, a proof of the correctness of their views?

Edwin E Turner.

*Coggeshall, Essex; January 14th, 1897.*

"Nature," for January 14th, contains an article on the "Bog Slide of Knocknageeha, in the county of Kerry," by Mr. Grenville Cole. Speaking of the origin of the disastrous bog slide, he says that it must be compared with the phenomenon of surface-creep. The ridging of soils upon steep hillsides is a similar but milder form of this sliding motion. In peat-bogs the water finds its way out in numerous channels into the main stream of some neighbouring valley, and the banks of these channels are always in a state of flux. During stormy weather the black, saturated lower layers of the bog are washed out in far larger quantities than the brown and dryer upper layers, as there is very little cohesion between the lower layers and the impermeable clay or other material which underlies the whole.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*An Introduction to Structural Botany.* Part II. Flowerless Plants. By DUKINFIELD HENRY SCOTT, M.A., Ph.D., F.R.S., etc. 312 pp. 8vo, illustrated by 114 figures. (London: Adam and Charles Black, 1896.) Price 3s. 6d.

The second part of Dr. Scott's admirable manual of structural botany is now before us. It consists of a most carefully worked out history of the structure of flowerless plants, which constitute more than half of the vegetable world. Professor Scott commences his work with details of the external characters of *Selaginella kraussiana*, as a type of the vascular cryptogams, following with the internal characters of the vegetative organs, and concludes with the reproduction and life-history. The same plan also obtains with the male fern *Aspidium felix-mas.* The "horse-tail" (*Equisetum*) and liverworts are followed by the mosses and algæ; the fungi, bacteri and myxomycetes, with a summary in conclusion, completing his work. In the former volume, Part i., Dr. Scott was enabled to give the main outlines of the structure of flowering plants by a full description of three representative types, but the great variety of organization among the flowerless plants has rendered necessary no less than twenty-three types. This large number even is hardly sufficient, as we observe more than one important group is treated generally and not specially. Still, the material particulars of the life-histories shown so clearly in this work will enable students of cryptogams to easily correlate the others, after studying the material described in this manual. Dr. Scott's style is so lucid that the veriest beginner will find pleasure as well as instruction in the pages of his work. To the ordinary reader who knows but little of the lower forms of plant life many of the facts will come as a revelation, especially with regard to the organs and manner of reproduction; which section of the life-history of these forms is treated with much fulness and modern information. Dr. Scott's position in the Royal Gardens at Kew, as Honorary Keeper of the Jodrell Laboratory, and his previous work as a professor in biology of the Royal College of Science, London, give a tone of authority for this book which will carry considerable weight with its readers. The work and its illustrations have been admirably produced by the publishers. It is one which cannot fail to hold its place among the most thoughtful of students of botany.

*The Lepidoptera of the British Islands.* Vol. iii. Heterocera, Bombyces, Noctuæ. 396 pp. large 8vo. By CHARLES G. BARRETT, F.E.S. (London: L. Reeve and Co., 1896.) Price 12s.

Mr. Barrett's great work on the British Lepidoptera is proceeding as fast as we could expect, considering the magnitude of his undertaking. There is no attempt on his part to found new theories or even to support in the least measure those of other modern writers. He goes steadily on the well-trodden path laid down in the first half of this century by Stainton, Newman, Doubleday, and the school of their period. For the British lepidopterist who cares more for his collection than the study of the morphology of our butterflies and moths, this work will provide endless interest. The notes appearing after the descriptions of the species are most valuable, because they contain the vast experience accumulated by Mr. Barrett during a long period of active field work. Added to these notes, the author has drawn largely upon the collecting experience of some of our best-known workers. It is seldom that one can find fault with a statement relative to the life-history of a British species of lepidoptera by Mr. Barrett, as his knowledge of the order is usually most exact. He should, however, use great care in the choice of expressions, when dealing with the records of others, unless he has serious reason to doubt their trustworthiness We cannot imagine that the author, while writing of *Gastropacha ilicifolia*, means that he doubts its occurrence in Yorkshire, when he says, on page 48, "About the same time larvæ are said to have been found on the moors near Sheffield and Ripon." The word "said" in that sentence seems to throw a doubt upon what many people know to be a fact, and may lead students in a future generation, when those now living who can vouch for the truth of the captures of *G. ilicifolia* have passed away, to imagine there was some doubt in our time about the fact. We think this last volume is an advance upon the two previous ones, as Mr. Barrett has evidently greater interest in and larger knowledge of the habits of the Noctuæ. We sincerely trust that the author may be spared to continue his work until he reaches the section of Micro-Lepidoptera, and we can only regret that he did not induce the publishers to commence the work with that division, for few living men have a greater knowledge of the life-histories included therein.

*Life in Ponds and Streams.* By W. FURNEAUX, F.R.G.S. 406 pp. 8vo, illustrated with 8 coloured plates and 311 figures in the text. (London: Longmans, Green and Co., 1896). Price 12s. 6d.

This handsomely produced book is another volume of Messrs. Longmans' "Outdoor World Library," and is an excellently compiled account of freshwater life and its collection. The book is divided into two parts, the first five chapters being devoted to "The Collector's Work, the remainder being on "Life in Ponds and Streams." Mr. Furneaux appears to have taken considerable pains to bring into his pages every subject which is likely to be met with by the amateur in his first few seasons, and the book will be found useful to many young people who, in the early spring, are searching for some interesting occupation for the coming year. It is hardly necessary to say that such works as this are of the utmost value in popularizing a taste for the study of nature. Any shortcomings may be readily overlooked in the good which will be effected by the publication of a work of this kind, and we cannot sufficiently compliment the publishers on its production.

*Catalogue of the Minerals of Tasmania.* By W. F. PETTEREL. 103 pp. 8vo. (Launceston: "Examiner" Office, 1896.) Price 2s. 6d.

This is something more than a Catalogue of Minerals, because many of the names are accompanied by interesting notes upon the position in which the subject is found, and the rarity or otherwise as well as the range of its distribution in the Colony of Tasmania. For instance, take "No. 34, Beryl (silicate of aluminium and glucina). The true emerald has not, so far, been found here, but

hexagonal prisms that are colourless to bluish-green have been obtained at Flinders Island; and, also, as water-worn pebbles in Stanniferole's Drift, at Mount Cameron. At the last locality a fairly good example was obtained some years ago. It consisted of a portion of a crystal about an inch in diameter and the same in length; it had the true hexagonal form and characteristic cleavage, and the colour was dull green, with a translucent appearance. The stone was mistaken by the miners for the peculiar form of copper ore. More recently another specimen was obtained in the drift of almost the same colouration, rather less in diameter, but nearly three inches in length. Near the Great Republic Tin Mine, at Ben Loman, this mineral has been discovered in exceptionally large and well-formed crystal groups. The find occurred in surface trenching across the granite rock, when a somewhat large quantity of beryl was exposed, intimately associated with extremely large and fine crystals of orthoclase. Many of the individual crystals of the beryl measured fully ten inches in length, and nearly two inches in thickness. The colour is unusual, being a mottled yellow-brown, with a dull lustre on the exterior surface." Then follows an analysis. We quote this as an example of the original notes in this little book, which cannot fail to be useful to the mineral collector.

*Fuel and Refractory Materials.* By A. Humboldt Sexton, F.I.C., F.C.S. 350 pp. 8vo, 104 illustrations. (London: Blackie and Sons, Limited, 1897.) Price 5s.

This work, though mainly intended for the use of students, will also be found to meet the requirements of engineers and others who require information on the subject of "fuel" for practical purposes. The author states in his preface that it is written to meet a want he has felt for many years, *i.e.* a manual, treating concisely and comprehensively of fuel, and yet holding a place between such exhaustive treatises as those of Dr. Percy and others, and the brief outlines of the subject which are to be found in manuals on metallurgy. The book commences with the theory of combustion and the chemical action and re-action of various combustibles. From this the author passes to the heating powers of different fuels. Mr. Humboldt repudiates Welter's law, that the heat evolved by a fuel when burned is proportional to the amount of oxygen with which it combines; he maintains that this can only be correct where there is no change of state or chemical change except combination; "but as in all solid fuels the solid carbon is converted into the gaseous form, the law breaks down and is of no practical use." Wood, peat and the various forms of coal are carefully analysed, and their respective heating powers shown by chemical formula. Pyrometry, calorimetry, and the utilization of fuel are also comprehensively dealt with. Chapter xv. is devoted to refractory materials. There is a good list of references at the end of the book and a most useful index, which will be a boon to many students who require the work only for reference.

*A New Course of Elementary Chemistry, including the Principles of Qualitative and Quantitative Analysis.* By John Castell-Evans, F.I.C. 237 pp. 8vo. (London: Thomas Murby.) Price 2s. 6d.

This is the third edition of this work, which aims at being more than a mere text-book for examinations, and "is intended to help students to attain a real knowledge of scientific chemistry." The problems are chiefly original, and are only in very few instances to be found in any other text-books. The author commences by making his readers fully conversant with the British and foreign system of units. This he does by giving problems to be worked from one system to the other; also in the varying theometric scales of Fahrenheit, centigrade, and Réamur. There is a full account of all data required to obtain the heat of sulphuric acid from its elements, and the mode of calculation therefrom. The method in which the kinetic theory of gases can be deduced is detailed in a very clear manner. Part ii. consists of chemical analysis, with detailed accounts of each experiment. To this edition an appendix has been added containing a few easy inorganic preparations.

*Allen's Naturalists' Library. A Handbook to the Game-birds.* By W. R. Ogilvie-Grant. Vol. ii., 316 pp. 8vo. Illustrated by 18 plates. (London: W. Allen and Co., Limited, 1897.) Price 6s.

Volume ii. of this useful series deals with pheasants (continued from vol. i.), megapodes, curassows, hoatzins and bustard-quails. These two volumes contain the names of every known species of game-bird, and may therefore be considered a monograph of the *Gallinæ*. The subject has been treated in this work in a similar manner to vol. i. To ensure exactitude the author has carefully compared and revised his descriptions with the specimens of these birds in the British Museum. Whitehead's bustard quail (*Turnix whiteheadi*) is described by him for the first time in this work. It was found at Manila by Mr. John Whitehead, after whom it was named. This species is most like the male of *T. dussumieri* in size and markings, but the general colour is different. Another new species mentioned is Cholmley's see-see partridge (*Ammoperdix cholmleyi*), discovered by Mr. A. J. Cholmley in the Erba Mountains, near Suakim, during a recent trip to the Soudan. The adult female is similar to the female of *A. heyi.*

*A Dictionary of Birds.*—By Alfred Newton, assisted by Hans Gadow. Part iv., 379 pp. Illustrated. (London: Adam and Charles Black, 1896.)

This is the last part of Mr. Newton's comprehensive work. The three previous volumes have been already noticed in these pages. Part iv. contains the Index and a lengthy Introduction to the entire work. In this Mr. Newton gives a short history of the study of ornithology, commencing with Aristotle, who was the first serious writer on birds with whose works we are acquainted. This classic naturalist only mentions about 170 different sorts of birds, which he divides into eight principal groups. His observations and descriptions are so meagre—being chiefly physiological—that it is impossible for his commentators to determine with any certainty what were the birds of which he wrote. Though other writers on ornithology appeared at long intervals, the first to issue a work conceived in anything like the spirit that moves modern naturalists was William Turner, a Northumbrian, who, while living abroad to avoid the persecutions, printed at Cologne, in 1544, a commentary on the birds mentioned by Aristotle and Pliny. This work was reprinted at Cambridge in 1823 by the late Dr. George Thackeray. The Introduction, as will be seen, is well worth reading, not only by those who have devoted themselves to the study of ornithology, but by all who wish to have a general knowledge of

the subject and of the work which has been done in it. The author comments on the fact that general works on ornithology have become fewer in the following manner: "On reviewing the progress of ornithology since the end of the last century, the first thing that will strike us is the fact that general works, though still undertaken, have become proportionately fewer, and such as exist are apt to consist of mere explanations of systematic methods that have already been more or less fully propounded; while special works, whether relating to the ornithic portion of the fauna of any particular country, or limited to certain groups of birds—works to which of late years the name of "monograph" has become wholly restricted—have become far more numerous But this seems to be the natural law in all sciences, and its cause is not far to seek. As the knowledge of any branch of study extends, it outgrows the opportunities and capabilities of most men to follow it as a whole; and since the true naturalist, by reason of the irresistible impulse which drives him to work, cannot be idle, he is compelled to confine his energies to narrower fields of investigation."

*The Story of Forest and Stream.* By James Rodway, F.R.A.S., F.L.S. 202 pp., and 27 illustrations. (London: George Newnes, Limited, 1897.) Price 1s.

This useful little work is one of the same series as "The Story of the Plants," by Grant Allen. The illustrations, which are very good, are chiefly of trees, plants and scenes of the tropics, as the author considers that the struggle and changing conditions of plant life are better portrayed in the luxurious growth of a warm climate than in England. Mr. Rodway has given a clear and interesting account of the work done by trees in large forests, carefully describing their use as well as beauty.

*The Photographer's Exposure Book.* By Frederick William Mills, F.R.M.S. (London: Dawbarn and Ward, Limited.) Price 1s.

This is a handy little note-book with valuable tables arranged in the orders of the months of the year, showing the length of time necessary for the exposure of the plate in various conditions of weather. There are also a number of pages for notes to be taken at the time of photographing; these are ruled in sections, to facilitate regularity of procedure and comparison.

*Everybody's Medical Guide.* By M.D. 122 pp. (London: Saxon and Co.) Price 1s.

This is a small guide to the lighter ailments of a household, giving the symptoms by which they may be easily recognised, and some simple remedies. It contains some useful suggestions for the maintenance of health, extracts from the laws relating to infectious diseases, and the charges usually made by medical men, together with other pieces of information which are likely to be of great use to the heads of households.

*Elementary Botany.* By W. Bland. Parts i. and ii., 152 pp., 8vo, 240 illustrations. (London: Bemrose and Sons, Limited.) Price 1s.

The first part of this useful little work treats of structural and systematic botany, and the second of vegetable anatomy and physiology. The work is arranged in courses of lessons suitable as the groundwork for lectures. Teachers taking an elementary class in botany would probably find it of use.

# MICROSCOPY

Preservation of Microscopic Specimens.—In the "International Journal of Microscopy and Natural Science" for January, 1897, an account is given of a method of preserving microscopic specimens of organs and tissues so that they retain the colour they had when fresh. M. Tores, after testing it for a year and a-half, finds it successful. He found that five to ten parts of a forty per cent. solution of formalin caused the organs after a time to assume a tint which differed very considerably from the natural colour, but if instead of water for diluting the commercial formalin solution, a solution of one part common salt, two parts of magnesium sulphate and two parts sodium sulphate in one hundred parts of water be used, the colour of the blood is well preserved. Objects preserved in such a solution are better adapted for microscopic examination, as the protoplasm of the cell is less altered and the nucleus stains more deeply.—*F. Winstone, Ockeridge, Epping.*

Acacia as a Popular Micro-Object.—The sprays of *Acacia* (*racemosa?*) sold just now in the London streets and elsewhere for button-holes and flower-vases, furnish quite a budget of interesting objects for the microscope. The small branches usually have several of the pretty whitish-green feathery leaves, and at the end a spray of bright yellow balls of many closely-set flowers. The whitish-green colour is caused by a layer of granules of wax which cover the surface of both stalks and leaves, and by a felty layer of small white hairs on the former. These should be examined opaque with a one-inch or half-inch objective, and light thrown on by bull's-eye condenser. At the base of the leaf-stalk or petiole a swelling is observed, the pulvinus: its purpose is to raise and lower the whole compound leaf in accordance with suitable external conditions. It is more developed in the well-known "sensitive plant," closely allied to this species. At the base of each pinnate leaflet there is a similar but smaller organ. To show the structure, cross-sections should be made and compared with others from another part of the stalk. On the upper surface of the petiole, between each pair of leaflets, is a small gland, almost globular, with a minute opening at the apex, often filled with a secretion, which probably gives rise to the pleasant balsam-like smell of the plant; they are covered with small closely-set hairs, and form interesting and pretty opaque objects for a low power. The flower-heads will repay careful examination. Space forbids more than mention of the many bright yellow anthers, the crystalline filaments, and the compound pollen, formed of several—about sixteen—simple grains adhering to each other, an arrangement which, though occurring in other plants, is not very common. The hairy, almost bristly, bright-coloured calyx, and the delicately-tinted petals, together form a beautiful miniature *regular* flower, very different in appearance from our native papilionaceous examples of the natural order Leguminaceæ.—*Jas Burton, 9, Agamemnon Road, West Hampstead, N.W.*

## BOTANY

LIMOSELLA AQUATICA IN CLARE.—Mr. Greenwood Pim says in the "Irish Naturalist," that he found this interesting plant growing at Lisdoonvarna. It is only previously recorded as being found in Inchiquin Lough, co. Clare, and near Gort, co. Clare. Can any of your readers tell me whether there is any other record of its appearance in Ireland?—*F. Winstone, Ockeridge, Epping.*

DR. WILLIAM TRELEASE, the Director of the Missouri Botanical Gardens, took for the subject of his presidential address this year, "Botanical Opportunity." He considers that research is much promoted when some or all of the results have to be imparted in a class-room, and that better work is done by professors actively engaged in teaching than would be the case if they were attached to a purely research institution.

The abnormal fungus-growth described in the January number of SCIENCE-GOSSIP, p. 207, is, I imagine, not so very uncommon. One at least (of which I made a sketch) has come under my notice, and in my late father's note-books I find drawings of two others. In all three cases the parasitic growth was exactly similar to that copied from "La Nature," except that the pileus of the parasite was not attached to that of the other. I am sorry I am unable to state to what genus and species they belonged.—*Geo. S. Saunders, 20, Dent's Road, Wandsworth Common, S.W.; January 19th.*

AGE OF THE ORCHIDÆ.—The age of the fibrous-rooted orchidæ is well indicated by the leaves and roots. In young plants of *Listera ovata* the leaves are often narrow-elliptic, and the root-fibres but few; whereas in older plants the leaves are broadly ovate or sub-orbicular, and the rootstock densely fibrous; moreover, all orchidaceous plants are, when of several years' duration, more robust, have larger leaves and more flowers in the inflorescences, and in the tuberculate-rooted species larger tubercules than the younger plants. *Listera* and *Ophrys* may be taken as types of the fibrous and tuberculate-rooted species respectively.—*H. E. Guiset, 3, Cathcart Hill, Junction Road, N.*

ALKALOIDS IN ORCHIDACEÆ.—In the "Memoires" of the Royal Academy of Belgium, just issued, Dr. E. de Droog has generalised the researches that have been made as to the formation of organic bases by plants of the orchid family. The first to investigate the subject appears to have been M. de Wildemann, who, in 1892, observed the presence of an alkaloidal product in *Dendrobium nobile, D. ainsworthii*, and other members of the orchid family. Out of 104 species of orchids which were examined, only nine were considered as producing alkaloids—some in all parts, others only locally. Dr. de Droog appears to favour the view that the alkaloids are for defensive purposes. His paper is illustrated by a plate in which alkaloids to be found in the cells of *Dendrobium nobile, Catasetum hookeri, C. macrocarpum* and the root of *Phalænopsis luddemanniana* are shown.

## ZOOLOGY

MR. CHALMERS MITCHELL, at a recent meeting of the Zoological Society, exhibited a case of alleged telegony. Sir Everett Millais, who has had much experience in the breeding of dogs, believed it to be a case of reversion. He explained in like manner all cases of reputed telegony. Mr. Tegetmeier, who has also had much experience, agreed with this conclusion.

BITTERNS IN HORSHAM.—On December 18th last, a fine specimen of the bittern (*Botaurus stellaris*) was, unfortunately, shot at Crawley, and has since been preserved by our local taxidermist. The last occurrence of this species in Horsham was in 1895, when, on January 20th, a young fellow named Laker captured one in a marshy spot a little way out of the town. Laker, who was quite unaware of its rarity or its identity, knocked it down with a stick. The bird was purchased by the Rev. A. Low, who had it preserved. Two or three weeks previously to this, another specimen was shot at Slaugham, but unfortunately no particulars were kept. It was preserved by Mr. A. Richardson, Horsham.—*Chas. J. Marten, 30, London Road, Horsham.*

ZOOLOGICAL NOMENCLATURE.—Lord Walsingham and Mr. J. Hartley Durrant have compiled a set of "Rules for Regulating Nomenclature with a view to secure a strict application of Law of Priority in Entomological Work." Messrs. Longmans, Green and Co. have published them in pamphlet form, price sixpence. These rules are called "Merton Rules," as they are in use at Merton Hall for all work done there. The authors would have all names according to the rules of Latin orthography, and would change those that are adopted from other languages. Names with similar sounds are rejected, also those which involve a false proposition. A name published before 1758, the date of the tenth edition of Linnæus' "Systema Naturæ," is not accepted as valid, and may be used in another sense by a subsequent author. Rule 12 defines publication, which is taken to mean that the public can have access to the matter in a form other than MS. As the rule stands at present it would apparently invalidate all species published in private papers distributed without charge. Of permissible names for the same conception only the one first published is valid, "provided that in its application its author has conformed to the requirements of publication and definition." In Rule 16 it is stated that "Definition must convey, either by description or by illustration in formation, that which may enable the author's conception to be recognized." Valid names are to be founded on types, with the exception that a new name may be substituted for one invalid as being homonymous either in its inception or in its adoption, and this may be done upon the evidence of published information or illustration, without the type having necessarily been seen by the author of the correction, but the type shall be the type to which the name applies.


CONDUCTED BY FRANK C. DENNETT.

| | Feb. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 6 | 7.32 a.m. | 4.57 p.m. | 21.22 | 15° 26′ S. |
| | 16 | 7.14 | 5.15 | 21.1 | 12° 8′ |
| | 26 | 6.53 | 5.33 | 22.39 | 8° 30′ |
| | | *Rises.* | *Souths.* | *Sets.* | |
| *Moon* | 6 | 8.44 a m. | 3.35 p.m. | 10.43 p.m. | |
| | 16 | 4.20 p.m. | 11.52 | 6.46 a.m. | |
| | 26 | 4.34 a.m. | 8.1 a.m. | 11.31 | |

| | Feb. | Souths. h. m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 6 | 10.36 a.m. | 4″ 1 | 19.44 | 19° 13′ S. |
| | 16 | 10.29 | 3″ 4 | 20.16 | 19° 36′ |
| | 26 | 10.41 | 3″ 0 | 21.6 | 17° 54′ |
| *Venus* | 6 | 3.7 p.m. | 10″ 9 | 0 15 | 2° 19′ N. |
| | 16 | 3.5 | 12″ 1 | 0.52 | 7° 19′ |
| | 26 | 3.0 | 13″ 5 | 1.26 | 11° 59′ |
| *Mars* | 6 | 7.41 p.m. | 5″ 1 | 4.50 | 25° 17′ N. |
| | 16 | 7.14 | 4″ 7 | 5.2 | 25° 27′ |
| | 26 | 6.49 | 4″ 2 | 5.16 | 25° 37′ |
| *Jupiter* | 16 | 0.45 a.m. | 20″ 6 | 10.34 | 10° 28′ N. |
| *Saturn* | 16 | 6.9 | 7″ 7 | 15.55 | 18° 10′ S. |
| *Uranus* | 6 | 6.36 | 1″ 7 | 15.46 | 19° 40′ S. |
| *Neptune* | 16 | 7.18 p.m. | 1″ 2 | 5.6 | 21° 18′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Feb. 1 | 8.13 p.m. | *1st Qr.* | Feb. 9 | 7.25 p.m. |
| *Full* | „ 17 | 10.11 a.m. | *3rd Qr.* | „ 24 | 3.44 a.m. |

SUN.—There is an annular eclipse on February 1st, quite invisible, however, in this country. It may be seen in the South Pacific Ocean, New Zealand, Central and a great part of South America. Spots seem to be now generally visible, though not of great extent or in great numbers. A large spot crossed the disc early in January.

MERCURY, although reaching its greatest elongation west (26° 23′) at 5 a.m. on the 16th, is ill-placed for observation, owing to its great southern declination.

VENUS daily gets into better position for the observer, reaching its greatest eastern elongation (46° 38′) at 10 p.m. on the 15th. It is interesting to watch the phases of this planet, the more particularly because the half-moon phase is frequently observed to differ by some (three to eight) days from the time of greatest elongation.

MARS now presents but a tiny disc to the observer, and so is difficult to observe except with fairly large instruments.

JUPITER, coming into opposition on February 23rd, at 2 p.m., is now at its best for the observer. The belts may be seen with very small telescopic power, whilst almost any pocket telescope will show the satellites. Jupiter is a little east of the 4th-magnitude ρ Leonis.

SATURN rises at 2.36 a.m. on February 1st, and about four minutes earlier each morning, and its apparent diameter slowly increases, whilst its ring system presents a magnificent appearance. It is best observed from 5 a.m. till sunrise, closely north-west of the beautiful 3rd-magnitude double star β Scorpii.

URANUS is not far from Saturn, being just east of the 4th-magnitude λ Libræ.

NEPTUNE can be observed in the evening just north-east of the 5th-magnitude 106 Tauri, and shining as an 8th-magnitude star.

VARIABLE STARS in good position during February are:—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| α Hydræ | 9.21 | 8° 59′ S. | 2·5 | 3·0 | |
| T „ | 8.49 | 8° 38′ S. | 6.5 | 10·5 | |
| R Leonis | 9.40 | 12° 1′ N. | 5 3 | 10·0 | 312·56 days. |
| R „ Minoris | 9.37 | 35° 6′ N. | 6·2 | <11·0 | 369·4 days. |
| R Ursæ Majoris | 10.35 | 69° 27′ N. | 6·0 | 12·0 | 302·3 days. |
| Ll. 17576 Cancri | 8.48 | 17° 41′ N. | 6·5 | 8·5 | * |

* Also variable in colour, yellow to red.

METEORS should be looked for on February 1st to 4th, 7th, 10th, and 15th to 20th.

A NEW COMET.—On December 8th, Mr. Perrine, of the Lick Observatory, discovered yet another of these bodies, shining as an 8th-magnitude star, with a tail less than the diameter of the moon, just south-west of ε Piscium. It is travelling eastward through the northern parts of Eridanus. As it passed its perihelion, according to Prof. Kreutz, on November 26th, its brightness was already waning at the time of its discovery.

THE RECENT OPPOSITION OF MARS.—Much has been said of late years respecting the so-called "canals" on Mars, attention to which was first called by Prof. Schiaparelli. Notwithstanding the small angular diameter of the planet, very many of these have been seen during this past season. Herr Leo Brenner, at the Manora Observatory, had picked up no less than eighty-four of these objects previously seen by Prof. Schiaparelli, together with twenty-eight new ones, before December 12th, according to his paper in "The Journal of the British Astronomical Society."

SUNSPOTS.—At the meeting of the British Astronomical Association, held on December 30th, Mr. E. W. Maunder, of the Greenwich Observatory, read a paper on "The Level of Sunspots," a subject attracting much attention at the present time. As a consequence there was a considerable amount of discussion on the paper, participated in by the Misses Brown and A. M. Clerke, Dr. Johnston Stoney, Messrs. G. M. Seabroke, W. H. Wesley, Alex. J. S. Adams, Edwin Holmes and C. Thwaites. The subject is too lengthy to discuss in a brief note such as the present, and we would inform our readers that it will be found reported at length in the journal of the Association.

DR. AXEL MÖLLER.—Dr. Möller, Professor of Astronomy and Director of the Observatory at Lund, in Sweden, has died, in his sixty-seventh year. He was elected an Associate of our Royal Astronomical Society in 1874, and received its gold medal in February, 1881. The motions of Faye's periodic comet were carefully investigated by him.

"AMATEUR OBSERVERS' ALMANACK" FOR 1897.—This is a card, seventeen inches by twelve inches, compiled by Mr. Arthur Mee, F.R.A.S., of Hamilton Street, Cardiff, and contains a large amount of useful astronomical information at a trifling cost. Mr. Mee is President of the Astronomical Society of Wales, a young but healthy society, which seems to be making steady progress.

# SCIENCE GOSSIP

Lady Prestwich has given to the British Museum the collection of fossils made by her husband, the late Sir Joseph Prestwich.

Dr. E. H. Du Bois Raymond, Professor of Physiology in the University of Berlin, died on December 26th, at the age of seventy-eight.

The St. Petersburg Academy of Sciences have elected Lord Kelvin and Professor Simon Newcomb honorary members. Lord Rayleigh has been elected a corresponding member.

Alfred Nobel, the well-known Swedish engineer and chemist, who died on December 6th at San Remo, has left his entire fortune, amounting to about £2,000,000, to the Stockholm University.

Measurements of the heights and velocities of clouds are being made at the Blue Hill Meteorological Observatory, Mass., U.S.A., by Professor Rotch, as part of an international scheme for such work.

Prof. J. E. Duerden, Curator of the Museum of the Institute of Jamaica, has recently published an article which gives new data concerning the results of the introduction of the mongoose to that island.

We hear that for some time past two pairs of kingfishers have taken up their abode by the ornamental waters of Battersea Park, in London, and seem as though they intend to become citizens of the great Metropolis.

A correspondent writes that in November last he observed some tomtits attacking his bees, tapping at the hive entrance, and when a bee came out seizing and carrying it off. As many as a dozen birds were observed at work at one time.

Sir William Macgregor discovered a new bird-of-paradise during his recent journey across British New Guinea. Mr. Sclater will exhibit an example of this bird, which has lately arrived in England, at the British Ornithologists' Club.

A fishing-smack, "Early Blossom," is stated to have brought into Lowestoft, on January 11th, a very large octopus. It was taken in the trawl-net near the Leman Sands, in the North Sea. It is said to have measured eleven feet in length, and weighed about five hundredweight.

Mr. Horatio Hale, of Canada, the well-known anthropologist, died on December 29th. He was vice-president of the Anthropological Section of the American Association for the Advancement of Science in 1886, and has done much to advance the study of this important subject.

A magnificent display of aurora borealis was observed at Kirkwall on January 2nd. It commenced shortly after twilight faded, and lasted for several hours. The "waves" of light took two forms, one being as long streamers from the horizon to zenith; across these there rolled scroll-like waves from west to east. The whole effect was the finest that has been seen in our northern islands for many years.

The German Government have voted a supply of 50,000 marks to the Ministry of Public Instruction, for investigations with the Röntgen rays. The object of the grant is to enable institutes and certain men of science to procure the necessary apparatus and to defray the expense of experiments.

A correspondent writes that a fine specimen of the golden eagle was shot on a farm near Driffield, in December last. It was only "winged" at first, and a severe struggle took place. It was, at last, captured alive, but we regret to say the capturer killed it the following day. The wings measured 5 feet 6 inches from tip to tip.

We learn from the "Entomologists' Record" that at a recent meeting of the Committee of the Entomological Society of London for the Protection of Lepidoptera, it was resolved to invite the co-operation of local societies throughout the United Kingdom, and to ask them to furnish information as to proceedings likely to cause the extermination of local species of lepidoptera. Communications will be received by the Hon. Secretary, Mr. Chas. G. Barrett, 39, Linden Grove, Nunhead, S.E.

M. M. G. Renaud states that the reason carrier-pigeons are rarely entirely white is because on their journeys those of a conspicuous colour are naturally selected by birds of prey, and thus the stock gradually disappears. To common pigeons this does not apply, as they rarely stray far from habitations, and are not so frequently struck by hawks. It is noticeable how much can be done by selection in the breeding of pigeons. For instance, French and Belgian breeders will train their birds for generations to fly from east to west. In England, where there is much fog, the breeders only keep birds that can fly through a misty atmosphere.

We have received a circular from the Geological Photographs Committee of the British Association, which was founded in 1889 for the purpose of arranging the "collection, preservation and systematic registration of photographs of geological interest in the United Kingdom." The Committee urge geologists and photographers to assist in forming this collection. Since the formation of the Committee about 1,408 photographs have been received and deposited at the Museum of Practical Geology, 28, Jermyn Street, S.W. Information with regard to the best means of taking such photographs, and rules for the sending of them, may be obtained from the Secretary of the Committee, Mr. W. W. Watts, 28, Jermyn Street.

The Tenth Annual Report of the Liverpool Marine Biology Committee for 1896, by Prof. W. A. Herdman, D.Sc., F.R.S., contains a short account of the series of experiments in sea-fish hatching undertaken at the Port Erin Biological Station last Easter on behalf of the Lancashire Sea Fisheries Committee. Though conducted on a small scale, for the want of space and plant, they were very satisfactory, the eggs of the grey gurnard (*Trigla gurnadus*), the lemon-sole (*Pleuronectes microcephalus*) and the witch (*Pleuronectes cynoglossus*) being successfully fertilized and kept until they hatched out as young larvæ. It is proposed, with additional tanks and an improved circulation of water, to carry the experiments still further this year. Lists and particulars of various additions to the local marine fauna and flora discovered during dredging expeditions are also given.

## NOTES & QUERIES

In reference to the meteor of November 29th, I may say that I saw one about the time mentioned. It began in the constellation Taurus, travelled through Perseus and disappeared in the zenith. It was visible for about four seconds, leaving a yellowish-white tail for two seconds. I did not note its path at the time, so I am afraid that this account is not so accurate as desirable.—*J. A. Lloyd, Peveril Drive, The Park, Nottingham.*

A Choked Kingfisher.—On December 23rd last I was shown a kingfisher which had met its death in rather a curious manner. Having caught a roach which proved a trifle too large for it, in attempting to swallow the fish the bird had apparently been choked. The bird, which was in the hands of Mr. A. Richardson for preservation, was in the flesh when I saw it, with the roach firmly fastened in its throat.—*Charles J. Marten,* 30, *London Road, Horsham, Sussex.*

Fossil Fern at Giant's Causeway.—In reply to Mr. Martin's wish for further information on this peculiar fern remains, I am sorry to say that at the time I saw it I was interested in something else and quite forgot to make a fuller examination of it; but it struck me as being something like *Polypodium vulgare.* However, the impression was so well marked, and the water so often washes over the spot that I cannot think any wind-blown specimen would find a permanent resting-place there. It was the very fact that basalt does not contain fossil remains which made me take notice of this instance. I will endeavour to procure a photograph of the rock later in the year, and if I can obtain any other information about this I will let him know through these columns what it is. His note of the big mushroom found at Upper Norwood is most interesting, but we are both far behind the one recorded recently, weight 22 lbs. 6 ozs.—*John H. Barbour, Bangor, Co. Down.*

Paternal Affection in Wild Birds.—Mr. F. W. Halfpenny has a paragraph with this heading on page 225 of your January number, and I fancy he will like to read the following extract from my note-book. I may say that Mr. Charman is a member of the Horsham Museum, and the "countryman" is a gardener at Nuthurst, Horsham. "Horsham, April 29th, 1895.—I have come across a curious idea with regard to the rearing of young birds. The countryman mentioned in the last note showed Mr. Charman a nest of young song-thrushes. These, he said, he was going to rear for himself. In a short time he would put them in a cage, which he would hang up in a tree. The parents, he declared, would bring food to the cage, which, however, he would not leave in the tree more than a week, for if he did the old birds would be sure to bring poison and kill the fledglings! Putting the infanticide out of the question, was the fellow deliberately inventing, or would the parents really tend their offspring under such conditions?" I never expected to meet with this poison idea again.—*Charles J. Marten.*

Seeds of Yucca.—Yucca plants at Nice not infrequently bear the large seed-pods in winter-time. In America the fertilization of the flowers depends on a special species of moth, *Pronuba yuccasella.* Does anyone know what insect takes its place in Southern Europe?—*John T. Carrington, Nice; January,* 1897.

Bacteria in Coal.—In a note entitled "Les Bactériacées de la Houille," M. B. Renault announces the discovery of bacteria in coal. The baccillus has been known to science for some 200 years; we now learn that it has existed since the far past of the Carboniferous system. In examining thin sections of coal under the microscope, M. Renault saw characteristic chains and colonies of micrococci and baccilli. He has named them provisionally *Micrococcus carbo* and *Baccillus carbo.* The existence of bacteria in the Carboniferous epoch is not merely in itself an interesting fact, but it also raises an important question as regards the origin of coal. Did these organisms, we must enquire, simply exist with the vegetation and become carbonized with it, or are they the agents by which it was changed into coal? The question cannot yet be answered with certainty. On the one hand, M. Renault points out they are much more numerous in coal than in vegetation preserved by silica or carbonate of lime, and of fewer species; they are not coloured like the coal, but appear as clear bands. This favours the latter view. On the other hand, the work of bacteria leads, when not arrested, to the complete disappearance of vegetable tissues. Thus if coal is due to bacterial action we must suppose this to have been arrested at different stages in the different sorts of coal.—*G. W. Bulman, Coalbridge-on-Tyne, December 26th,* 1896.

Marine Natural History.—As a diligent and appreciative reader of Science-Gossip I have frequently been dismayed by the almost total absence in recent years of communications in your columns with reference to the life-history of the flora and fauna of the sea. I cannot believe that this is due to any flagging of interest in these engrossing studies on the part of earnest naturalists who have the necessary facilities for their prosecution. It would rather seem that those who have taken the trouble to master the necessary preliminaries find in these studies themselves and in watching the development of the many beautiful forms, either in their rock-pool homes or in captivity, sufficient occupation for leisure moments, without publishing descriptions of their experience for the edification of others. Those, however, who like myself, are debarred from more than a rare visit to the sea-side would gratefully welcome an occasional paragraph in your columns giving an account of some fresh "find," or of some new locality where the more interesting forms of marine life may be found, or of other matters of instruction to those whose interest in marine natural history has to be sustained solely by daily watchings of the aquarium. In the event of my suggestion meeting with your approval, and of your consenting to offer the necessary facilities in forthcoming issues, I should be glad if you would insert this note amongst the "Notes and Queries" in your columns. We should then, doubtless, ascertain whether other students of marine biology entertain views similar to the above, and whether or not any considerable number of them would feel disposed to assist in encouraging further interchange of experience in one of the most fascinating branches of natural science.—*John Tatham, M.D., The Avenue, Surbiton; January 16th,* 1897.

# TRANSACTIONS

The South London Entomological and Natural History Society.—January 14th, 1897. Mr. R. South, F.E.S., President, in the chair. Mr. Routledge exhibited specimens of *Acronycta menyanthidis*, from Carlisle, with a white thorax; *Xylophasia rurea*, from North Devon, light grey with fine lines; *Agrotis segetum*, with silvery fore-wings and unusually white hind-wings; *Noctua c-nigrum*, with the *c* reduced to two spots; and a *Triphæna pronuba*, from Epping, with lunules on the hind-wings. Mr. R. Adkin, *Tephrosia crepuscularia*, bred spring brood March and April and summer brood June, some of the latter being equal in size to the former, *T. biundularia*, bred in May, all from the London district. Also, on behalf of Mr. W. F. de V. Kane, *Dianthæcia capsophila* from a small island off the Kerry coast, with examples from Howth and Isle of Arran (Galway) for comparison; the Kerry specimens were unusually dark for the species and were bred. Mr. Hewett, of York, exhibited a varied series of *Tæniocampa munda*, from York, including a fine mahogany-coloured form; a melanic var. of *T. (cruda) pulverulenta;* a series of vars. of *Abraxas grossulariata*, including a var. *varleyata*, bred from a wild larva; the various forms of *Arctia lubricepeda*, including a series of intermediate forms; a preserved hybrid larva from ova laid by a female *T. munda*, taken *in cop.* with a male *T. stabilis* at York, 1896; series of vars. of *A. sylvata* (*ulmata*), one being suffused and several unusually free from markings; three females of *Odonestis potatoria* of the male colouration; and three *Saturnia carpini*, one having left hind-wing very pale, one very dark male, and a female having hind-wings approaching the male colouration. Mr. Barrett, on behalf of Mr. Kane, a specimen of *Boarmia repandata* var. *destrigaria*, *Phthothedes captiuncula* and *Aciptilia tetradactylus*, all from Ireland; also a series of *Eupithæcia consignata*, bred in and continuously since 1874, and only on one occasion, some ten years ago, had a wild strain been introduced. At first they gradually decreased in size, but after the introduction of a wild strain and the sleeving-out process, they increased in both size and depth of colour. Mr. Tutt, a long series of *Acherontia atropos*, bred by Mr. Borroughs, of Rainham, showing considerable variation in the colour of the "skull," and said that he did not consider the species adapted to exist in this country, they were forced. Mr. South, a series of *Tephrosias* from Japan. Mr. Bacot, series of the same from Epping, etc. Mr. McArthur, a living larva of *Aplecta occulta* and a bred series of *Heliothis peltigera*. Mr. Young, of Rotherham, very long series of *Spilosoma lubricepeda* var. *zatima* and var. *fasciata*, and a var. very closely resembling var. *deschangei* of *S. menthastri*. It was noted that all British entomologists who bred this species obtained intermediate forms freely, while it was not so on the Continent. To illustrate his paper, Mr. Hewett exhibited very long series of both broods of *T. crepuscularia* and also series of *T. biundularia*. These were from some fifty or sixty different localities. Most of the known forms were shown, as well as preserved larvæ: on behalf of Mr. de V. Kane, the latter species from Irish localities, and both species, from Swansea, on behalf of Mr. Robertson. He then read a most exhaustive paper on these two species, and included in it were the observations and experiments of more than fifty well-known entomologists who had been interested in this question. In the discussion that followed, Mr. South asked (1) did any character exist by which the species could be separated with absolute certainty? (2) Which was the commoner species? To the former no answer was forthcoming, but to the latter members agreed the *T. crepuscularia* was very local, while *T. biundularia* was more common. Mr. Barrett was of opinion that as a result of Mr. Hewett's paper, all distinctions between the two were now completely swept away. Mr. Tutt thought that here were examples of recent evolution, in fact we had species in the making, as in the case of some of the *Zygænas*. He insisted that the naming of the two forms, and the consideration of them as distinct, although very closely allied, was a matter of convenience, necessitated in our comparisons with Continental and Asiatic representatives. Messrs. Carpenter, Bacot and others continued the discussion.—*Hy. J. Turner, Hon. Report. Sec.*

North London Natural History Society.—December 19th, 1896. Mr. L. B. Prout, Vice-President, in the chair. Messrs. J. E. Gardner and Ernest A. Nash were elected members of the society. Exhibits: Mr. Bishop, *Cheimatobia boreata*, *Oporabia dilutata* and *Hybernia aurantiaria*, taken on the fence of Claremont Park, near Esher. Mr. L. J. Tremayne, ferns from North Wales and the New Forest. Messrs. Harvey and Casserley were appointed auditors for the year. Mr. Casserley read a paper on "Centipedes." He said the class Myriapoda is divided into three orders: Chilognatha, comprising all the millipedes; Pauropoda and Chilopoda, or centipedes proper. He proceeded to give a general description of the structure of centipedes, and, in describing their habits, said that the females of *Geophilus subterraneus* remain with their young until the latter are in a fairly advanced stage of development, which is very unusual in articulate animals. Centipedes do not go through any larval stage, but the young when first hatched from the egg are very similar to the perfect animal, only they are broader in proportion to their length, and they have not so many segments to the body as the mature form. Each successive cast of skin up to a certain limit shows additional segmentation. *Lithobius forficatus* is the species most commonly found in this country, but the Scolopendræ are also found plentifully, and as they are very closely allied, it is not always easy to pick out Lithobius. The genus Geophilus also contains a good many species, a very widely-known one being *G. longicornis*, frequently found at the roots of turnips, and destroyed by farmers under the impression that it is damaging their crops, which is a great mistake, as the centipede does not care for turnips, but is really doing a great deal of good by destroying the terrible turnip-flea and other insects which get their living out of turnips. Mr. Casserley proceeded to compare the centipedes with the woodlice and the more highly specialized worms. He considered they could be put down as the lowest form of arthropod animals, and failed to understand why, according to the modern classification, they are put in such very close relation to

the Insecta, which are obviously the most highly specialized of all the Arthropoda. There could be only one reason for placing them in that position, and that was that their method of aerating the blood is very similar to that of the Insecta, and certainly different from that of the lower forms. Messrs. C. Nicholson, Harvey, Wheeler, Miss Nicholson, and Messrs. Bacot, R. W. Robbins, L. J. Tremayne, Dadd and Simes took part in the discussion which followed. The proceedings terminated with the usual vote of thanks.— *Lawrence J. Tremayne, Hon. Sec.*

Royal Meteorological Society.—The annual general meeting of this Society was held on Wednesday, the 20th inst., at the Institution of Civil Engineers, Great George Street, Westminster, Mr. E. Mawley, F.R.H.S., President, in the chair. The Secretary read the report of the Council, which showed that the Society had made steady progress during the past year, there being an increase of seventeen in the number of Fellows. The President then delivered an address on "Shade Temperatures," in which he stated that of all meteorological observations there were none approaching in importance those made of the temperature of the air, generally known as "shade temperature." Indeed, the first question invariably asked in regard to almost any climate was as to its temperature. Mr. Mawley traced the history of the different methods of exposing thermometers since the time that regular observations of the weather had been made in this country. For many years open screens were most favoured by meteorologists, that devised by Mr. J. Glaisher, F.R.S., and the late Astronomer-Royal (Sir G. B. Airey) being the pattern principally used. In 1864 Mr. T. Stevenson, C.E., invented an admirable form of closed screen with louvred sides, which was considered preferable to the open type of screen, and has now almost entirely superseded the Glaisher stand. In 1883 the Stevenson screen was considerably improved by a Committee of the Royal Meteorological Society. Mr. Mawley then described his own experiments at Croydon and Berkhamsted, as regards this improved screen, known as the Royal Meteorological Society's pattern. He showed that the only two defects which had been attributed to this form of thermometer exposure were virtually non-existent, and therefore advised its general adoption both in this country and on the Continent. Mr. Mawley had recently made observations in the Stevenson screen, and also in the screens used in France and Germany, and the conclusion he had come to was that the results obtained in the Stevenson screen were not only the nearest to the true air temperatures, but also more likely to be strictly comparable with temperatures taken in a similar screen but with different surroundings elsewhere.—*William Marriott, Assistant Sec.*

Hull Scientific and Field Naturalists' Club.—The first meeting this year was held in the Friendly Societies' Hall, Albion Street, Hull, on Wednesday evening, January 6th. The President, Dr. J. Hollingworth, M.R.C.S., occupied the chair. There was a very good attendance of members. Mr. J. W. Boult exhibited the preserved larva and pupa and also some living specimens of the swallow-tail butterfly (*Uropteryx sambucaria*), which he had reared. Mr. T. Sheppard handed round some huge bones which had recently been dug up in the vicinity of Goole and sent over by Mr. Thos. Bunker, of that place. On comparing these with the large whale's skeleton in the Hull Museum, they proved to be part of the bones belonging to the fin of a young whale, no doubt a relic of the old whaling days. There are several grooves and impressions on them, which have evidently been made by a plough-share passing over. It was pointed out that in the neighbourhood of the Humber, and especially around Hull, the lower jaw-bones of the whale are frequently used as gate-posts, or as ornaments in gardens, etc. Odd ones are to be seen utilized in this way at some villages which are situated a good distance from the Humber. Mr. A. H. White brought a series of platinotype photographs of local antiquarian interest. These were most beautifully executed. A few lantern-slides, representing the homes and habits of sea-gulls at Twigmoor gullery and Scarborough respectively, were thrown on the screen by the President and Mr. Slade. Several books and pamphlets were added to the library, which formerly belonged to the Hull Field Naturalists' Club. These included several of the first numbers of the "Naturalist" (1864), and other interesting items. Mr. J. A. Ridgway, F.R.A.S., of Beverley, and Mr. A. Dobson, of Hull, were elected members of the society. The rest of the evening was occupied by a lecture on "Astronomical Measurements," by the Rev. H. P. Slade, F.R.A.S. This was of a very interesting character, and was illustrated by a number of lantern-slides. The lantern used was one of the lecturer's own design, and had many advantages over ordinary lanterns. The new illuminant, acetylene, was also used, with success. On the proposition of Mr. Ridgway, F.R.A.S., seconded by Mr. A. H. White, a hearty vote of thanks was accorded to Mr. Slade for his valuable lecture. Mr. Ridgway, who had not met the lecturer before, but had made use of his "micrometer," complimented him on the lucid manner in which he had expressed himself, and Mr. White, who had made the acquaintance of Mr. Slade through the pages of the "English Mechanic," gave some humorous remarks respecting his first attempts at studying astronomy. Several other gentlemen also spoke, and the proceedings were brought to a close by some experiments with acetylene gas.—*T. Sheppard, Hon. Sec., 78, Sherburn Street, Hull.*

The Scarborough Field Naturalists' Society, January 14th, 1897. The President, Mr. D. W. Bevan, in the chair. Three new members were proposed and elected. The minutes of the annual meeting were read and confirmed. Christmas festivities having interrupted work since last meeting, there were few records. A burbot fish, fifteen inches long,' was reported as having been taken by a trawler in deep water. This is rather unusual, as it is more often taken in fresh water. A fine paper nautilus was exhibited by Mr. W. J Clarke; also a pair of ruffs in breeding plumage. Two single valves of the large mollusc *Pinas* were shown, the latter one measuring over twenty-four inches in length. These were from abroad. Mr. J. A. Hargreaves showed a very fine specimen of *Gryphea incurva*, commonly known as "the miller's thumb," which may be found on the shore. Mr. W. Gyngell exhibited a few varieties in shells. Mr. W. Bevan showed a chart of the movements of Mars since October 20th, 1896, which indicated quite a variation from its usual course. The presidential address followed these reports, and the new President, Mr. D. W. Bevan, gave a very pleasant account of "The naturalist at his

best," opening with the following quotation from "The Autocrat of the Breakfast Table": "One-storey intellects, two-storey intellects, three-storey intellects, with skylights. All fact-collectors who have no aim beyond their facts are one-storey men. Two-storey men compare, reason, generalize, using the labours of the fact-collectors as well as their own. Three-storey men idealize, imagine, predict. Their best illumination comes from above through the skylight." He then went on to show how, in the society, there were one-storey men who collected facts, specimens, etc., and made records of them; two-storey men who, as well as collecting, studied the structure, habits, and peculiarities of species; and three-storey men who, beyond the scientific and practical, studied the æsthetic, poetic, and ideal side of nature. Continuing, the President said no society was at its best until all the members were hard at work, and it should be the duty of every member to assist the recorders if they found specimens, and in all cases they should make absolutely reliable entries, as they were often used by scientists of repute, the late Charles Darwin himself referring to the subject. In studying the structure and habits of animals, good solid text-books were the best. There were books which, although very interesting reading, imparted no great amount of practical knowledge. While keeping collecting well to the front they should take greater interest in the structure or habits of the animals or insects they studied.

### NOTICES OF SOCIETIES.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

Feb. 11.—"Photo-micrographs of Entomological Subjects," with the lantern, by F. Clark.
„ 25.—"Notes of Observations during my holidays at Freshwater and in Scotland." By Hy. Tunaley, F.E.S.
Mar. 11.—Discussion on "Insect Protection." Opened by C. G. Barrett, F.E.S.
„ 25.—Lantern Lecture by Fred. Enock, F.L.S., F.E.S.
Apr. 8.—"On the Nature of Genera." By J. W. Tutt, F.E.S.
„ 22.—"Paper by E. Step, F.L.S.

Papers have also been promised by F. Merrifield, F.E.S., G. R. Grote and others.—*Hy. J. Turner, Hon. Report Sec.*

NORTH LONDON NATURAL HISTORY SOCIETY.—The following are amongst the fixtures for next session:

Feb. 11.—Discussion on "Overcrowding and its Remedies." Opened by L. J. Tremayne.
Mar. 27.—Visit to the Epping Forest Museum.
Apr. 8.—Discussion: "The Filices or Ferns." Opened by R. W. Robbins.
May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.
„ 15.—Whole-day Excursion to Brentwood.
„ 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
„ 10.—Debate: "Is Vivisection Justifiable?"
„ 19.—Half-day Excursion to the Lea Valley.

There will also be a special-family discussion entitled, "The Liparidæ," to be opened by A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

LAMBETH FIELD CLUB AND SCIENTIFIC SOCIETY.—We have received the following list of fixtures for the forthcoming session:

Feb. 1.—"The Uses of Beauty in Nature." Miss C. A. Martineau.
„ 15.—Discussion on "Electricity." Opener, W. Rivers.
Mar. 1.—"To Norway in Quest of a Shadow." A. C. D. Crommelin, F.R.A S.
„ 13.—Visit to Natural History Museum.
„ 15.—Photographic Demonstration. H. W. Cosson.
April 5.—"Simple Types of Plant Life." E. J. Davies.
„ 10.—Visit to Zoological Gardens.
„ 19.—Easter Monday.—Outing to Effingham.
May 3.—"Some of our Smaller Song-birds." E. W. Harvey-Piper.
„ 8.—Outing to Sanderstead (with Selborne Society).
„ 22.—Visit to Kew Gardens.
June 7.—Whit-Monday.—Outing to Cheshunt.
„ 19.—Outing to Caterham.

*H. Wilson, Hon. Sec.,*
14, *Melbourne Square, Brixton Road.*

## NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage

SUBSCRIPTIONS.—Subscriptions to SCIENCE-GOSSIP, at the rate of 6*s.* 6*d.* for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

ALL editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

SUBSCRIPTOR IGNORAMUS.—Will you explain your desires a little more fully to Mr. F. C. Dennett, 60, Lenthall Road, Dalston, N.E., who would always be glad to receive suggestions for the improvement of the Astronomy column.

### EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

OFFERED, thirty-five species Maltese land shells, Miocene, Kimeridgian and Liassic fossils, all named. Wanted, microscopical literature, condenser and lamp.—T. Cooke, Thorndale, Lincoln.

OFFERED, nice nests, with data, of dipper, stonechat, sedge-warbler, grasshopper-warbler, chiff-chaff, goldcrest, creeper, coal-tit, grey wagtail, rock-pipit, corn-bunting, goldfinch, lesser redpoll, twite, water-rail. Wanted, clutches of eggs in British list.—R. J. Ussher, Cappagh, Lismore, Ireland.

WANTED, offers for SCIENCE-GOSSIP, 1885 (plates), 1886, 1887, 1890, 1892; also cuttlefish, spiders, anemones, etc., all preserved in spirit.—W. Gomm, Overndale Villa, Downend, near Bristol.

ASTRONOMICAL telescope, 2¼ object-glass, brass table-stand, two astro, two terrestrial eye-pieces, sun-cap, in mahogany case; desiderata, microscope or accessories.—A. Henley, 303, Strand.

MANY foreign shells, chiefly marine, in exchange for other foreign shells not in collection.—W. Turner, Liberton, Edinburgh.

SEVERAL good pigeons for exchange, comprising Blue Chequers and Antwerps; desiderata, scientific instruments, books, minerals, birds, eggs, shells, or offers.—Ashley Rosevear, 113, New King's Road, Fulham, S.W.

MACHAON, Crataegi, Edusa, Aglaia, Cinxia, Athalia, Iris, c-album, Cardui, T. quercus, Rubi, Betulæ, Lineola, Paniscus, etc., and many moths wanted; number of duplicates to offer.—J. Bastin, Ivy House, New Road, Reading.

SIX vols "English Flora" (Smith). Joyce's "Scientific Dialogues," eight vols. "Cassell's Illustrated History of England," Robinson's "Hardy Flowers," etc.; offers. Wanted, books on mosses, dissecting and other microscopes, or will exchange mosses.—Peter Yates, Astley, Manchester.

BECK'S "Popular," "Star," and Ross No. 3, latest pattern, with all accessories offered; wanted, Beck's National Binocular 1896 pattern.—Sir C. Purcell Taylor, 2, Powis Place, W.C.

OFFERED, Prof. D. McAlpine's *Zoological Atlas* (Vertebrata and Invertebrata), 40 coloured plates and nearly 300 figures, published 18s.; desiderata, lantern or microscope slides, Cambrian, Glacial, good Carboniferous, Cretaceous, or foreign fossils.—E. A. M., 69, Bensham Manor Road, Thornton Heath.

OFFERED, varieties of Helix nemoralis and H. hortensis, and mounted specimens of Manitoba plants, in exchange for microscopic slides.—F. Winstone, Ockeridge, Epping.

ANDRÉ BONNET, 55, Boulevard St. Michel, Paris, offre (1) Coquilles eocènes du Bassin de Paris; (2) Coquilles miocènes de Touraine; (3) Catalogue raisonné and illustré des Coquilles oligocènes du Bassin de Paris, par M. Cossmann, en échange de Coquilles tertiaires et récentes.

# NANSEN'S JOURNEY TO THE POLE.

THE results to science in general of Dr. Nansen's journey to the "Farthest North" cannot at present be stated. The three years' collection of materials and data to be dealt with on his return by naturalists and other scientific experts have yet to be examined, and it may be a year or two before the full results are known. But apart from this, the account of the Expedition, so admirably told by Dr. Nansen in his book just published, (1) leads one to expect some very valuable additions to scientific knowledge, quite apart from the great geographical discovery which the world owes to this intrepid explorer.

Dr. Nansen is pre-eminently a man of science. Nature-study and sport had a great fascination for him in very early life. Distinguishing himself by his success as a bear- and seal-hunter, he did also, in his young days, much valuable scientific work, particularly in the field of biology. He would suffer considerable self-sacrifice to obtain opportunities for the prosecution of scientific research. He was at one time Curator of the Bergen Museum, during which time he published a number of pamphlets on scientific subjects. Later, being still a young man, he made his famous journey across Greenland.

The excitement of exploration made a strong appeal to the romantic and enterprising character of Nansen, and ere long he meditated his now world-famed journey to the North; which, it should be noted, was not undertaken through any empty or ill-considered ambition, but after much study, and with the object of proving the correctness or otherwise of his theory as to the existence of a polar current, which he conjectured ran from the New Siberian Islands to the east coast of Greenland.

In his book Nansen makes no attempt whatever to state the advantages likely to accrue to science as a result of the many observations made by him. His aim has been to record experiences, not results—to give a narrative account of the Expedition such as would be of

THE "FRAM" IMPRISONED IN THE ICE.
(*Copyright by Constable & Co.*)

(1) Fridtjof Nansen's "Farthest North." Constable and Co.

general interest. The importance of the oceanographic, meteorological, astronomical and magnetic observations made remain yet to be stated. Nor is the world's store of knowledge increased by any statement by Nansen of the probable age and structure of the palæocrystic ice, fact that biological materials are not so plentiful nor so varied in the extreme latitudes traversed by him. But notwithstanding this, the keenness of Nansen's scientific spirit has resulted, as might have been expected, in the collection of a wealth of materials for investigation.

Movable Meteorological Station.
(*Copyright by Constable & Co.*)

majestic masses of which he encountered in every direction.

Botany, zoology and some other departments of science do not appear to have benefited as fully as by some other expeditions whose pioneers have not been so well favoured as Nansen. This is not the fault of Nansen, however, but is due to the

In zoology the most important facts noted are the discovery of foxes and narwhals as far as the 85th parallel, and the discovery, in Prince Rudolf Land, of the nesting-place of the rare Ross's gull (*Radostethia rosea*), specimens of the species of which were brought home.

The expedition took photographs of every scene

or object of interest met with—landscapes, seascapes, animals, birds, and natural phenomena generally. They closely applied themselves to the work of dredging and studying the character and distribution of animal and plant life. Star-fish, algæ, and even bacteria, were taken from the pools in the drifting ice. The long Arctic summer day was busily spent in examining, under the microscope, the objects almost invariably found existing in the freshwater pools of the ice-floes.

But, mainly, Nansen's account of his expedition concerns itself with upsetting pre-existing theories as to the physical character of the Pole. Nansen has made a great geographical discovery. Arctic explorers before him believed in the existence of considerable areas of land dotted about in a shallow circum-polar basin. Nansen himself was amongst those who believed this. No one anticipated the discovery of a deep oceanic sea in the Polar area. Nansen states that the Pole itself probably lies in this deep ocean bed, although its extent is not at present known; but it extends a long way north of Franz-Josef Land to the New Siberian Islands. Soundings were taken of depths exceeding 2,000 fathoms. Nansen believes that for a considerable distance to the north of the course followed by the *Fram* there is a deep-sea area without any islands to affect the movements of the ice. The temperature, as also the salinity at different depths of the Polar Sea, leaves little doubt in Nansen's mind that the Polar oceanic depression is continuous with the deep Atlantic basin.

The success of Nansen's expedition was due not only to the hardiness of the Norsemen who made up the party, but first and foremost to the scientific training of Nansen's own life, and his power to anticipate every difficulty experienced by previous Arctic explorers. The minutest care was taken, and every possible necessity provided for, before the expedition started. Nansen set out with the idea, which was Professor Mohn's before him, that a continuous current ran from the New Siberian Islands north-westerly across the Polar area to the coast of Greenland, and he laid himself out to establish the proof of it, which he has done.

The *Fram* left Christiania on Midsummer Day, 1893. It made its way to the north of the White Sea and the coast of Nova Zembla, then south to the Kara Sea. Finding a fair passage, it pushed its way through the land-water (discovering a new island, which was named Sverdrup's Island, by the way) and soon rounded Chelyuskin, the most northerly point of the old world, and thence to a region of walruses, available as food. Towards the end of September the ship got imprisoned in the ice at about 78½° N. latitude, and in the same longitude as the most westerly of the New Siberian Islands; and here preparations were made for the arctic winter night. For the next eighteen months the *Fram* began to drift, sometimes southwards, then south-easterly, and it seemed as though Nansen was to be disappointed in the attainment of his object. The winter passed away, summer came and went, and the Expedition found themselves still drifting. The *Fram* behaved excellently—well built as she was—under the terrible pressure of the ice.

Nansen, after careful deliberation and discussion with his companions, resolved to leave the *Fram*, and make his way northwards over the ice, taking with him dogs, boats and sleighs. Lieut. Johansen was his sole companion. Nansen himself made, from bamboo and sail-cloth, the two kayaks which played so important a part in the lives of the two explorers after quitting the ship. Pushing their way northward they found themselves, in a few weeks, at a geographical point which had never previously been reached, namely, 86° 13·6′ N. latitude. Here they were stopped all further progress, as the ice was moving southerly almost as fast as their efforts to go further north. Nansen then directed his course towards Franz-Josef Land, which was distant four hundred and fifty miles from this point.

The thrilling experiences of the two explorers as set out by Dr. Nansen himself must be read to be appreciated. Sleighing over the ice, at other times making their way in kayaks over the water-lanes, mingled with adventures with bears and walruses, the life of these two men had aspects at once romantic and pathetic. At Franz-Josef Land Nansen and his companion met the Jackson-Harmsworth Expedition. Meanwhile, under Captain Sverdrup, the *Fram* continued to drift as far north as Spitzbergen, and soon found Nansen standing on her deck in Tromsö Harbour.

The expedition to Central Africa, supported by the Royal Society, with the object of investigating the fresh-water fauna of Lake Tanganyika, in relation to its supposed marine origin, and of establishing the connection of that lake with the other great African lakes, which was undertaken by Mr. J. E. S. Moore, has resulted in the following discoveries. Mr. Moore's statement is telegraphed by Reuter: "I found the fauna of Tanganyika to be unique—unlike anything else anywhere—and as limited as peculiar. The jelly-fish and shrimps were certainly of a marine type, while the geology of the district precluded the possibility of any connection with the sea in recent times. The water, which Livingstone found to be brackish, is now quite drinkable. All this seems to prove that the Tanganyika part of the great Rift Valley running through this part of Africa at one time had access to the sea, while it is perfectly clear that Lake Nyassa—some 246 miles to the south-east—apparently never had any marine connection. It is also a matter of interest that the fauna of Tanganyika is not only marine, but of a very peculiar and primitive type, and it is quite reasonable to suppose that the characteristics of the fauna are connected with the remote geological connection of the lake with the sea."

# FOREIGN VARIETIES OF BRITISH LAND AND FRESHWATER MOLLUSCA.

By T. D. A. Cockerell.

WHILE it seems to me very desirable that the variations of British mollusca should be named and described, it has sometimes occurred that those who have undertaken this work have not been aware of what has been done abroad, and so have fallen into errors. Unfortunately, no complete list of the named varieties and mutations of our mollusca exists, nor could one be prepared without a great deal of research in some such library as that of the British Museum. The writer, however, has a MS. list which is approximately complete up to the middle of 1887, and this, with such additions as have come to his notice, is herewith presented as a provisional list of the foreign varieties of British land and freshwater mollusca. The slugs are omitted, because a complete list of them will be found in the check list published in 1893.

It should be clearly understood that the names are cited from the literature, without any attempt, in the great majority of cases, at critical revision. Only those who have the specimens before them can undertake to determine which are synonyms and which are wrongly assigned to the species under which they appear. As regards the latter, it is certain that for every supposed variety which can be shown hereafter to be a distinct species many so-called species will be found to possess only varietal rank. Descriptive notes are given on some of those most likely to be found in England.

(1) Hyalinia lucida, Drap.
*septentrionalis*, Bgt.
*farinesiana*, Bgt.
*navarrica*, Bgt.
*calabrica*, Paul.
*blauneri*, Shuttl.; France. A little larger, more depressed; umbilicus larger.
*syriaca*, Kobelt.
*convexiuscula*, Moq.; France. A little larger, more convex; umbilicus a little larger.
*obscurata*, Moq.; France. Larger, more depressed, with a very obscure keel; umbilicus larger.
*requienii*, Moq.; France. Sometimes larger, very depressed, with a marked keel; umbilicus a little larger.
*planulata*, Stabile.

(2) H. cellaria, Müll.
*blondiana*, Bgt.
*pictonica*, Bgt.
*sieversi*, Bttgr.; Caucasus.
*subaperta*, Bttgr.; Caucasus.
*chelia*, Bgt.
*sancta*, Bgt.; Syria.
*sicula*, Kob.; Sicily.
*villæ*, Mort.
*silvatica*, Mörch. = *elevata*, Broeck.; Denmark, Sweden, Belgium. Practically identical with our *compacta*, Jeff.
*obscura*, Loc.; France. Rather darker than type, but more transparent; 9 mm. diam.
*subalbida*, Loc.; France. Whitish below, little transparent, generally large.
*major*, Baud.
*maculosa*, Pascal; France. Smaller, greenish, compressed, with irregular whitish spots all over the shell.
*hypozona*, Pascal; France. With a not very distinct brown band below.
*alliaria* "Millet," Hazay.
*sylvestris*, Gass.
*maculata*, Loc.; France. Horn colour, with yellowish flecks.
*minor*, Loc.; France. Diam. less than 10 mm.
*plana*, Esmark.
*albina*, West. Bluish-white, almost opaque; practically the same as our white variety.
*præcox*, West.; Italy.
*chersa*, Bgt.; France, Switzerland, Germany.

(3) H. helvetica, Blum.
The following varieties are assigned to *H. glabra*; some may belong to our species:
*aquitanica*, Chp.
*anceps*, West.
*barraudi*, Moq.; S. France, Switzerland, etc. Larger, slightly depressed, more strongly coloured.
*hungarica*, West.; Hungary.
*striaria*, West.; Galicia, etc.

(4) H. alliaria, Mill.
? *cantabrica*, West.
*anceps*, West.; Sweden.
*shepmanni*, West.; Holland.
*suballiaria*, Bgt.; Algeria.

(5) H. nitidula, Drap.
*dutaillyana*, Mab.; France, Switzerland.
*hiulca*, Jan.
*ressmanni*, West.
*sinistrorsa*. Shell sinistral.—See Zool. Record for 1879.
*carthusiana*, Loc. Greenish-white, crystalline,
*opaca*, Loc.; France. 9½ mm. diam., completely opaque, milk-white, shiny, depressed, with deep sutures.
*detrita*, D. and M.; France. Small, excoriated in places, showing a nacreous tint.
*alpicola*, D. and M.; France. Smaller, more strongly striated; mouth more rounded.
*minor*, Stabile. Westerlund gives 6 to 7 by 3 mm.
*albina*, Riem. = *margaritacea*, A. Schm. This is our *helmii*.
*beryllus*, West.
*amiatæ*, Paul., MS., West.; Italy. Lat. 8–9; alt. 4 mm.
*major*, West.; France, etc. 15 by 7 mm.
*olearis*, West.; Sweden, Denmark.
*lundensis*, West.; Sweden.
*subnitens*, Bgt.; France, Spain.

(6) H. RADIATULA, Alder. (*hammonis*, Ström.)
*jaccetanica*, Bgt. Said by Westerlund to belong to *H. petronella; subnitidosa*, Mouss., is the same.
*virescens*, Esm.

(7) H. PURA, Alder.
The names *viridula* (Manke) Kobelt and *lenticularis*, Held., appear to belong to our well-known forms. Paulucci has called a form *lenticula*.

(8) H. NITIDA, Müll.
*sinistrorsa*. Shell sinistral; see Zool. Record for 1879.
*borealis*, Cless; N. Sweden.
*parisiaca*, Mab.; France, Sweden.
*machoi*, Serv.; Spain.

(9) H. EXCAVATA, Bean.
No varieties recorded from abroad. Westerlund cites only Schleswig as a locality for the species out of Britain.

(10) H. CRYSTALLINA, Müll.
*subterranea*, Bgt; France, Germany, Sweden.
*humulicola*, Mab.; France.
*orientalis*, Kim. Practically the same as our var. *complanata*.
*hydatina*, Rossm. Larger; aperture a little more oblique.
*nitidissima*, Baud.
*subrimata*, Reinh.
*pseudohydatina*, Bgt.
*major*, Morel.
*dubrueili*, Cless.; France, Switzerland. A sub-var. of our var. *contracta*.

(11) H. FULVA, Müll.
*major*, Moq. Much larger.
*pratensis*, Baud.
*montana*, Baud.

(12) VITRINA PELLUCIDA, Müll.
*angelicæ*, Beck. Norway, Iceland, Greenland. A distinct species according to Westerlund.
*draparnaudi*, Moq.; France.
*vellaviana*, Pascal.
*perforata*, West.; Sweden, Germany, France.
*sinistrorsa*. Shell sinistral.—See Zool. Record for 1879.
*brunnensis*, Ulicny.
*minor*, West. Small, depressed, thinner, hyaline, aperture rounded.
*bellardii*, Poll.; Italy. More shining, flatter above, more convex below, smoother, minutely striatulate at suture.
*radiata*, Amstein.

(*To be continued.*)

## EXTINCTION AND NATURALIZATION OF PLANTS.

As all the numerous organic creations in the earth are continually changing, perhaps nothing shows this change better than plants. Nearly every one knows that in an individual plant the tissues and growth are ever changing; but plants also seem to be moving from place to place, or to locally go out of existence altogether.

Under these circumstances no one who has made inquiries in this subject will have failed to note how exotic plants gradually establish themselves in a country, while some become more and more scarce every year till they finally disappear. The foreigners have generally a hard fight before they are classed by botanists as natives; while the extinct plants still figure in the printed floras long after their total disappearance from the country or county. The printed floras do not therefore always contain trustworthy localities; and further, they tend to make rare plants disappear more quickly than would be the case if their haunts were kept a little more obscure from the general public.

Whether rare plants disappear or not generally depends on their attractiveness and beauty, also on their marketable value, when they are eagerly sought for and carried away wholesale by hawkers, etc. These plants, such as primroses, periwinkles, daffodils, wild orchids, snowdrops, lilies-of-the-valley and ferns, are local if not exactly rare, though they are soon made so in some districts by these rogues. *Tulipa silvestris* and some of the wild orchids are occasionally lost by new workings in old chalk-pits, and on railway embankments. Others are lost by turning pasture-land into arable fields; by floods; the building of railways; the improvement of rivers; the encroachment of the sea; the clearing of forests; the drainage of bogs, etc.

Exotic plants are introduced into our meadows, woods, etc., by natural or artificial means, also as strays and garden waifs. As agents promoting the first-named we may mention winds, rivers, seas and birds. The second, by intentional naturalization, many plants having been made at home by this method. The white dead-nettle (*Lamium album*), which is a very common weed in some parts of England, was once carefully transplanted to Scotland, and at present some enthusiastic plant-lovers are trying to establish that most beautiful of all our native orchids, the ladies'-slipper (*Cypripedium calceolus*) in our woods, which were once favoured with its presence. Bulbs, such as snowdrops and daffodils, specially lend themselves to this treatment, and a wood planted with hardy-growing subjects forms a quiet and beautiful wild garden. Strays are generally short-lived, but the opposite is occasionally the case. Garden rubbish is thrown into plantations and the bits of plants live for a little time and may even spread. Foreign grasses and weeds are sown in pastures and lawns; and trees from plantations and arboreta gradually establish and spread themselves, and soon have the appearance of having been wild for years.

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# BRITISH FRESHWATER MITES.

By C. F. George.

In Science-Gossip for 1881, 1882, 1883 and 1884 are papers written by me on *Arrenurus* (a family of freshwater mites), in which I described and figured the members of this family I had then met with and identified.

I have now to add two more species not described in any of these papers, and, so far as I know, not before recorded as British. The first, *Arrenurus crassipetiolatus*, Kœnike, is a very beautiful blood-red mite, reminding one somewhat of *A. tricuspidator*, but rather larger. The males of the Arrenuri are easily identified by their tails, one species differing so palpably from another that a very casual examination under the microscope is sufficient for identification. The figures accompanying this article have been kindly drawn for me by my friend, Mr. Chas. D. Soar, who has had the living creatures from me. The legs are not figured, they are of the usual *Arrenurus* type, the last leg having the remarkable spur on the last joint but two well developed. The tail, which is well and clearly figured, requires no description, but should be compared with the other figures of the males of this family to be found in the volumes of Science-Gossip mentioned in the beginning of this paper. I may say that all these creatures are most beautiful, and best examined whilst alive; yet very interesting mounts in balsam can be prepared from them, although the colours, of course, are greatly altered. When well mounted, they form very beautiful additions to the cabinet, and will last for years. I have not yet identified the female of this mite; the male was found by me on September 9th, 1895.

The second mite is much smaller than *A. crassipetiolatus*, it is of a beautiful green colour, and is at present known as *Arrenurus bruzelii*, Kœnike. Its colour becomes bluish when mounted in balsam; it appears to be Koch's *A. albator*, and with minute examination and some imagination, it will be found to agree with the figure in his "Deutschlands Crustaceen," etc., Heft 12, Taf 15-16, published 1835-41; but why he should name it *Arrenurus albator*, Müll., I cannot imagine. Müller's figure does not resemble it either in shape or colour. It has been found and described by several authors, in different countries, and under different names; according to Piersig, Bruzelius described and figured it under the name of *A. emarginator*, in 1884; Krendowskij as *A. albator*, in 1885; Kœnike as *A. bruzelii;* whilst Berlese named it *A. mallcator*.

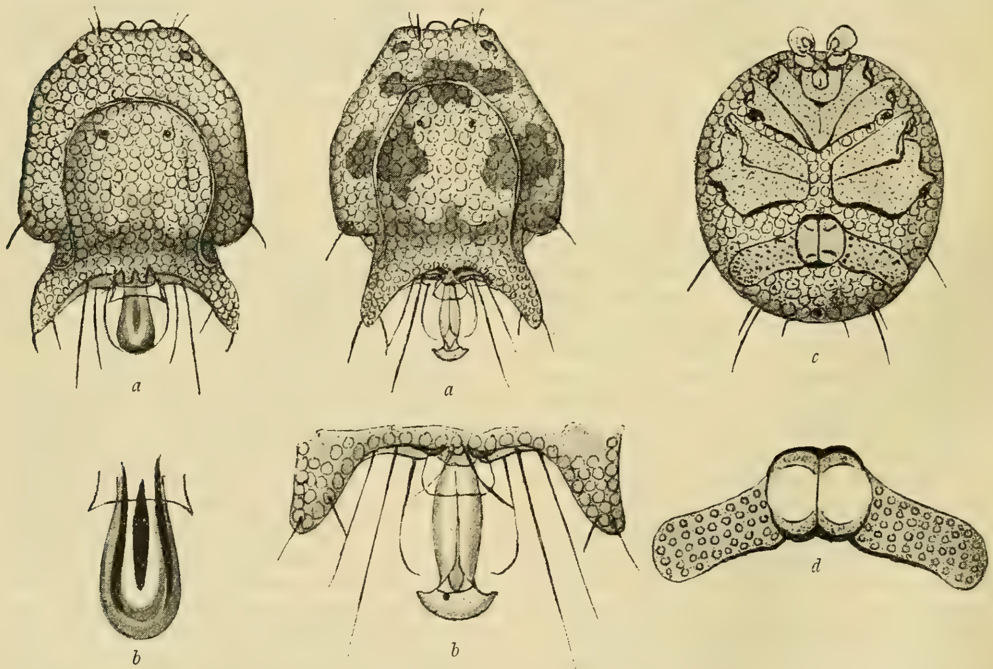



Fig. 1.—*a*, *Arrenurus crassipetiolatus*, male; *b*, tail.

Fig. 2.—*a* *Arrenurus bruzelii*, male; *b*, tail; *c*, female; *d*, genital plates of female.

*Kirton-in-Lindsey; January*, 1897.

# PLANTS AND MOSSES IN NORWAY.

By William Edward Nicholson.

THE expedition of the "Norse King" to Vadsö, on the Varanger Fiord, for the purpose of observing the total eclipse of the sun on August 9th last, though a failure from an astronomical point of view, at least afforded an almost unique opportunity to a naturalist of visiting a remote and interesting part of Norway under favourable circumstances. Unfortunately, the expedition was at least a month too late for seeing the country at its best. The sun sank at midnight for a short time below the horizon the night after we rounded the North Cape, for the time since the end of May. Though it is true that there was no real night and there was light enough to read by at midnight, yet with the first setting sun autumn may be said to commence in these high latitudes. Nature had fulfilled her purposes; the berries were ripe and the young birds were ready to fly away.

But few opportunities for natural history work presented themselves on the outward voyage, though such as occurred were taken advantage of. The first port touched at was Stavanger, in the South of Norway, from whence an excursion was made overland to Odde, crossing the Horre Pass at about 3,000 feet, where many plants such as *Cornus sulcica* and *Menziesia cœrulea*, which were over lower down, were met with in flower, as indeed were many of them again, almost at sea-level, in the far North.

On leaving Odde we did not touch anywhere until we reached Bodö, well within the Arctic circle, where we had a day on shore. The surroundings of Bodö are picturesque, and by climbing the hills at the back of the town we obtained a fine view of the distant Lofoten Islands. It is much to be regretted that some of our party did not remain at Bodö, as it was on the line of totality, and was favoured with a clear sky on the morning of the eclipse. The duration of totality was, however, shorter than at Vadsö, and the altitude of the sun at the time was too low to admit of very delicate observations. The whole country round Bodö, at least the low land, with the exception of a hard road made across it, appeared to be covered with bog of varying degrees of stability, the firmest portions being where the peat had been cut for fuel, or where the cultivation of a few patches of rye was attempted. Islands of rocks rose from time to time above the level of the bog, and formed more stable ground, on which there was frequently a scrubby growth of birch, aspen and several species of willow. On the mountains at the back of the town there were several rock-basins which had evidently at one time contained small mountain tarns, but which had become filled up by the growth of peat. Both here and elsewhere in Arctic Norway I was surprised to find that the species of *Sphagnum* did not appear to play so important a part in the growth of the peat as I had expected. Several species occurred in nearly all the bogs, but generally they did not form so large a proportion of the vegetation as they do in our English bogs. Various species of *Salix* and *Vaccinium* and *Rubus chamœmorus*, with other smaller plants, appeared to very largely form the peat.

Leaving Bodö, we called the next day at Harstad, a picturesque little town, with white houses and green meadows down to the water's edge. Many interesting mosses were gathered in some marshy openings in a birch wood close to the town, but there was no time for much work as the ship left again at 1.30 p.m. The neighbourhood of Harstad was well wooded, and I was very much struck by the fact that the trunks of the trees were entirely destitute of mosses. Rotten stumps harboured their peculiar species, but there were none on the living trunks. In the south of Norway, on the contrary, the trunks of trees were frequently thickly clothed with mosses, especially with various species of *Ulota* and *Orthotrichum*. Possibly the lower temperature and keen winds might account for their absence from this habitat in the north, as in all other situations they would be thickly covered with snow during the winter.

After leaving Harstad we did not touch anywhere until we reached Vadsö, at midnight on the 2nd August. The scenery in northern Norway, after passing Hammerfest, is stern and desolate throughout; but on rounding the North Cape it became still more inhospitable. The sombre, precipitous cliffs, tinged only at sunset with a warmer hue, gave place to the low, featureless shore on either side of the broad mouth of the Tana river, across which, when we passed, there hung a heavy veil of fog. The same scenery is continued along the northern shore of the Varanger Fiord, and very desolate the dreary little town of Vadsö looked, thinly scattered along the margin of a narrow inlet. Although the surroundings of Vadsö did not look promising for botanical work, yet they proved to be fairly good on a closer acquaintance. To the west of the town, and parallel with the shore, are several tiers of raised beaches, which attracted the attention of the geologists on board and proved to be very good for the plants requiring a dry situation. Here it was that the curious and interesting *Diapensia lapponica*, L., was most abundant. A stream had cut through the raised beaches, providing an excellent section

of them, and the deep, loose banks thus formed afforded a special locality for plants. The rest of the ground was mostly bog of varying degrees of humidity. Climbing the low hills beyond the raised beaches provided no escape from the endless morass, as the bogs formed on the flat table-land above were at least as wet as those in the valleys.

During the stay of the "Norse King" at Vadsö, from the 2nd to the 9th of August, I made an excursion with a friend to the southern shore of the fiord, where we stayed for two days at a small settlement called Elvenes, on a long narrow inlet from the South Varanger. The Pasvik River, which drains the large lake Enara, and is an excellent salmon stream, ran into the fiord just below the little hotel at which we stayed, which was close to the Russian boundary. The scenery on this side was quite different from that at Vadsö, and the South Varanger Fiord, with a chain of low mountains on either side from which long promontories projected into the water so as apparently to enclose it as a lake, was much finer than anything to be seen on the north of the Varanger. This quiet scenery was especially beautiful at night, when the ruddy glow of sunset slowly swept round the northern horizon with scarce diminished splendour until it flamed into daybreak, lighting up, as it passed, the dark waters of the fiord with ever-changing streaks of fire, and causing the wet glistening rocks on the mountain side to glow like dying embers. One could, indeed, appreciate the force of Wordsworth's simile, "As lovely as a Lapland night." The vegetation too was far more luxuriant. The path from the landing-stage was bordered with large tufts of the handsome pink (*Dianthus superbus*), and led through a wood with birches from thirty to forty feet high, and a few scattered pines and alders. The stony torrent beds in the wood were frequently covered with a luxuriant growth of the rose-bay and tufted-vetch, so that it was at times difficult to realize how far north we really were. The wood was especially appreciated after Vadsö, where the scrubby birches and willows which maintained an existence there were seldom as much as five feet high.

On the return journey we called at Hammerfest, where the Tyven (1,240 feet), a mountain rising close behind the town, proved rather rich botanically; and also at Tromsö, where, as the ship ran aground, there was rather more time for observation. Tromsö is quite a cheerful looking place for its latitude, and the huge plants of *Heracleum giganteum*, which was very common in the gardens, gave them quite a luxuriant appearance. In one part of the town a large number of the leaves of this bold plant were being dried, but for what purpose I could not ascertain.

Besides these places in Arctic Norway we also called at several places farther south; but as most of the time was consumed in sight-seeing, there was not much opportunity for botanical work, and in the following list I have only noticed a few mosses from the southern localities, as but little was done among the higher plants. I was, however, rather pleased at finding the local fern *Struthiopteris germanica* in some abundance at Stalheim.

Upwards of 160 species of flowering plants and ferns were gathered or noticed in the Arctic parts of Norway, of which the following were among the most interesting:

*Thalictrum alpinum*, L.—Not uncommon in a bog at Elvenes, growing on Sphagnum.

*Ranunculus hyperboreus*.—This curious little species occurred in several places near Vadsö, and by the shore of the Pasvik river at Elvenes, creeping on wet mud.

*Trollius europæus*, L.—Over at Vadsö, where it was common in seed. Some perfect flowers were, however, gathered on high ground at Tromsö on August 12th.

*Arabis petræa*, Lam.—On the raised beaches to the west of Vadsö.

*Subularia aquatica*, L.—Growing with *Ranunculus hyperboreus* by the shore of the Pasvik river at Elvenes.

*Dianthus superbus*, L.—Occurred at Vadsö, below a rocky ledge to the west of the town. It was, however, far commoner on the southern shore of the fiord.

*Silene acaulis*, L.—Large cushions of this little Alpine plant were common on the Tyven at Hammerfest.

*Cerastium alpinum*, L.—A very hairy form of this plant occurred on the island at Vadsö from which the observations on the eclipse were to have been made.

*Oxytropis lapponica*.—Raised beaches near Vadsö.

*Dryas octopetala*, L.—Only noticed on the Tyven, at Hammerfest, where a few specimens were in flower as late as August 11th.

*Rubus chamæmorus*, L.—Common everywhere in the north, but especially so at Elvenes, where the little hillocks which it forms in the bogs were quite bright with its handsome orange fruit.

*Sibbaldia procumbens*, L.—Common at Vadsö. *Saxifraga oppositifolia*, L.—Mountains above Bodö. The flowers were over. *S. aizoides*, L.—Swampy places by rivulets at Bodö, Vadsö and elsewhere. *S. nivalis*, L.—Bogs near Vadsö. *S. stellaris*, L.—Very abundant in bogs near Vadsö, where most of the specimens were covered with viviparous buds in lieu of flowers. I was for some time at a loss to know what this strange-looking plant could be, but after some search a few perfect flowers were found mixed with the viviparous buds on a few specimens. This form, the var. *comosa*, is also recorded from Spitzbergen.

*Ligusticum scoticum*, L.—Growing by the shore with *Mertensia maritima*, Don., both at Vadsö and Tromsö.

*Cornus suecica*, L.—Very abundant about Vadsö, where it was still in flower. In one spot a long series was gathered illustrating the gradual reversion of the white involucral bracts into leaves, some being only faintly streaked with green, others almost equally divided into white and green halves, and others being green with only faint indications of white.

*Linnæa borealis*, Gronot.—Fairly common, both at Vadsö and Elvenes.

*Erigeron alpinus*, L.—Meadows about Harstad.

*Gnaphalium norvegicum*, Gun. — On the raised beaches, Vadsö.

*Saussurea alpina*, Dc.—Abundant and often very luxurious in swampy places by rivulets at Vadsö, Elvenes and Harstad, often growing with *Carduus heterophyllus*, L.

*Sonchus alpinus*, L.—By a stream near Vadsö.

*Hieracium alpinum*, L.—Not uncommon on hill-sides at Vadsö.

All the four British species of *Vaccinium* occurred on the Varanger. *V. myrtillus*, L., was very abundant in fruit at Elvenes, and a stunted form of *V. uliginosum*, L., fruited freely at Vadsö. *V. vitis-idœa*, L., appeared to be rare in Arctic Norway, though very abundant in the southern parts. *V. oxyoccus*, L., though not common, occurred in many of the bogs. The fruit was just beginning to ripen, but that of the previous season was often present and still fit to eat.

*Arctostaphylos uva-ursi*, Spreng.—Not very common; it occurred in the woods about Elvenes. *A. alpina*, Spreng.—Abundant in berry in dry open places, as on the raised beaches at Vadsö and the mountains above Bodö.

*Andromeda polifolia*, L.—Common everywhere in bogs. It was mostly over, but a specimen was gathered in flower near Vadsö. *A. hypnoides*.—This curious species, which, notwithstanding its specific name, is more like a Club moss than a *Hypnum*, was fairly common on the Tyven at Hammerfest, but was not noticed elsewhere. The corolla had unfortunately fallen in all cases.

*Menziesia cœrulea*, Sm.—Common on mountain sides in all the places visited in Arctic Norway. A few lingering flowers might be seen in elevated localities.

*Ledum palustre*.—Common in the bogs about Elvenes. The underside of the leaves and the stem of this plant are covered with a rust-coloured down, and it has a very pungent smell which is said to keep mosquitoes at bay; but, as far as my experience went, they entirely ignored it, as they did eucalyptus, or, indeed, any measures taken against them.

*Pyrola rotundifolia*, L.—This handsome species was rather common in the bogs near Vadsö. Its long curved style and open flowers well distinguish it from its congeners in the field.

*Primula farinosa*, L.—Occurred about Vadsö, but in seed only, the flowers having long been over.

*Trientalis europæa*, L.—Evidently very common in Arctic Norway early in the season. A considerable patch was found in flower near Vadsö, where a snow-drift had only recently thawed.

*Gentiana nivalis*, L.—In a swampy spot near Vadsö, *G. involucrata*.—Vadsö and Tromsö, in open, sandy places. It is distinguished from *G. amarella*, L., and *G. campestris*, L., with both of which it sometimes grew, by the absence of the fringing hairs from the throat of the corolla.

*Diapensia lapponica*, L.—Common on the raised beaches near Vadsö, the Tyven at Hammerfest, and the mountains above Bodö. The flowers were over, but the firm, persistent calyx was very conspicuous. It grows in very exposed places; but the hard, leathery leaves and the compact habit of the plant enable it to withstand all the vicissitudes of the weather.

*Limosella aquatica*, L.—On damp mud at Elvenes with *Ranunculus hyperboreus* and *Subularia aquatica*.

*Veronica spicata*, L.—Stony places by the Pasvik River at Elvenes.

*Bartsia alpina*, L.—Common by streams and in marshy places in all the northern localities visited.

*Pedicularis sceptrum-carolinum*, Rudb.—This very handsome species was fairly plentiful in the bogs about Vadsö and Elvenes, where it was very conspicuous, the tall spikes of yellow flowers with a purple lip being frequently over three feet high. It is called by the Norwegians "kongsspir," and was named by Rudbeck in honour of Charles II. of Sweden.

*Oxyria reniformis*, Campd.—Common on loose stony banks about Vadsö.

*Polygonum viviparum*, L.—Very abundant about Vadsö, and frequently quite green with the growing viviparous buds.

*Königia islandica*.—This tiny annual occurred both at Vadsö and Hammerfest on moist but not boggy ground in fairly extensive patches of a reddish-green colour.

*Empetrum nigrum*, L.—Abundant about Vadsö, the streets of which were thickly strewn with it on the occasion of a very sad funeral from a British ship during our stay.

*Betula nana*, L.—Common in all the places visited in Northern Norway. In one locality near Vadsö there was a most interesting series of hybrids between this species and *B. alba*, L., some partaking more of one parent and some of the other. The form has been named *B. intermedia*, but there can be no doubt as to its true origin.

*Salix herbacea*, L.—Common on the Tyven. A

great many species of *Salix* occur in Arctic Norway, but they were not in a good condition for identification at the time of our visit.

*Potamogeton nitens*, Weber.—In the river Pasvick at Elvenes. I submitted this specimen to Mr. A. Bennett, the authority on the genus, who kindly named it for me, and pointed out that it differed from most forms of the species in the shortness of the spikes, tenuity of the leaves and slender stems.

*Narthecium ossifragum*, Huds.—Marsh near Bodö. It is stated by Bentham, in his " Handbook of the British Flora," not to be an Arctic plant.

*Tofieldia palustris*, Huds.—Common in seed in the bogs near Vadsö.

Several species of *Carex* were common, but I parted with my specimens before attempting their identification. *Eriophorum vaginatum*, L., and *E. polystachum*, L., were common in bogs on the Varanger, the dense, cottony heads of the former being frequently larger than is usual with British specimens.

Although grasses suitable for pasturage are rare on the Varanger Fiord, a considerable number of species, such as *Molinea cærulea*, Mœnch., *Nardus stricta*, L., *Aira cæspitosa*, L., and *A. flexuosa*, L., are fairly abundant. None of them, however, would be very attractive to cattle. *Phleum alpinum*, L., was not uncommon at Harstad.

In striking contrast to the southern parts of Norway, ferns are comparatively rare in the north. *Woodsia ilvensis*, Br., occurred in damp crevices of rocks near Elvenes, but the plants were very stunted as compared with some noticed at Stalheim.

*(To be continued.)*

## THE CHANNEL ISLANDS.

By Alfred H. Bastin.

*(Continued from page 215.)*

As the steamer enters the harbour the appearance of St. Helier does not impress one very favourably. It seems to be a busy and rather dirty little port; the quays and warehouses convey an idea of " town life," which is not pleasing to the traveller in search of the open country. But when one becomes better acquainted with the locality, and finds out how easy it is, by the aid of the two small railway systems, to reach open heaths, bold rock-bound stretches of coast and lovely sandy bays, one soon forgets the harbour and its surroundings.

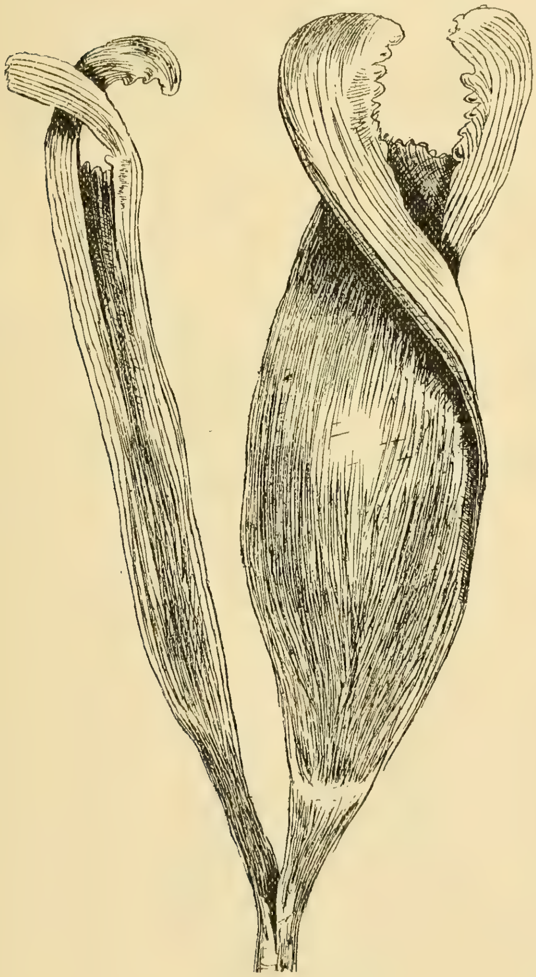
By the aid of the Western Railway, St. Aubin —a distance of four miles from St. Helier—can be reached in the course of half-an-hour. This spot is a good base of operations, as the whole of the shore from St. Aubin to La Corbière is worth a thorough investigation. For instance, a whole day might well be spent at Portelet Bay. The steep ground sloping up from the beach is clothed with vegetation, bracken, ling and blackberry-bushes predominating. Butterflies are numerous. I observed some I had not previously noticed in the islands: *Gonepteryx rhamni*, *Vanessa io*, *V. urticæ* and *V. c-album*. *V. polychloros* was also being found in the lanes farther inland. *Helix nemoralis* was exceedingly plentiful on the herbage close to the shore. When looking through a list of shells collected from the beach at Jersey, a naturalist would at once infer the extremely rocky nature of the coast. At Portelet Bay the following were collected: *Nassa reticulata*, *N. incrassata*, *Murex erinaceous*, *Littorina littoralis*, *L. rudis*, *Trochus ziryphinus*, *T. lineatus*, *T. umbilicatus*, *T. cineria*. The shell of *T. ziryphinus*, when alive, exhibits a lovely blue tint, difficult to describe but exceedingly beautiful in appearance; unfortunately this colour entirely fades a few hours after the animal has been killed. *Purpura lapilius* is found on the rocks in very large numbers, the shells showing a great variety in colour and banding. Limpets are everywhere strewn on the surface of the stone. All that were examined proved to be *Patella vulgata*. Farther along the coast two species of the curious " coat of mail " shells were found on the under surface of small stones in rock-pools at low water; these were *Chiton fascicularis* and *C. cinereus*. The number and beauty of the sea anemones was remarkable, although the species did not appear to be numerous. In some instances closely-packed groups covering patches of rock a yard or more square were noticed. Dead specimens of *Cardium edulis* and *Tapes palustra* were picked up on the sands in St. Aubin's Bay. In a little " chine " called La Rosière *Thecla rubi* and *Zygæna lonicera* occurred.

So much for the Western Railway district. Now let us turn our attention to Mount Orgueil Castle, on the Eastern system. The grounds of this ancient pile proved quite a happy hunting-ground, so far as lepidoptera are concerned. Besides most of the insects previously mentioned, the pretty "holly blue" (*Lycæna argiolus*) was found. Numbers of these little butterflies were to be seen flying about in the sunshine or sitting with half-opened wings on the pink blackberry blossoms. *Bombyx quercus* simply swarmed here. It was to be seen on all sides—flying round the grey walls, settling on the ivy, or soaring in the sunshine. We managed to beat out one specimen of the " Jersey Tiger " (*Callimorpha hera*). These few notes must not be concluded without mention being made of the pretty green lizards (*Lacerta viridis*) which abound on the island wherever there are rocks and stones for them to hide amongst. They may often be seen sunning themselves in the open, but they rush back into their holes like a flash of green light on the slightest suspicion of danger.

# ABNORMAL PLANTS.

By Edwin E. Turner.

THE accompanying sketches represent two of the largest specimens of fasciated stems which have come under my notice. The holly (*Ilex aquifolium*) was obtained from a hedge which $1\frac{1}{8}$ inches. The wallflower (*Cheiranthus cheiri*) grew in a cottage garden, and its dimensions before drying were—length, $7\frac{1}{2}$ inches; width at base, $1\frac{1}{8}$ inches; widest part, $1\frac{5}{16}$ inches.



Holly (*Ilex aquifolium*).

Wallflower (*Cheiranthus cheiri*).

had been cut down some time before, and the figure is from one of the new shoots, which fact seems to point to the probable cause of this peculiar staghorn-like growth as being some damage done to the buds in cutting. Its total length was 36 inches; from fork to apex, $17\frac{1}{2}$ inches; width of widest branch, $2\frac{1}{4}$ inches; and other branch,

I have also a stem of willow (*Salix*, sp.) which is much longer than that of the holly above-mentioned, but only one of the forks is flattened, and then only to the extent of about five-eighths of an inch.

*Coggeshall, Essex;*
*February 3rd*, 1897.

# MICROSCOPIC ALGÆ.

By James Burton.

IT would be difficult to suggest any more beautiful objects for examination under the microscope, and certainly none are easier to obtain than the common species of lower algæ. Owing to the wet and mild weather we have been having, they are to be found everywhere: on old walls, fences, and tree-trunks, and on the ground at the base of these they are abundant. The dweller in town, as well as his more fortunate country *confrère*, has them plentifully at hand. While all are interesting and may be easily investigated by even the beginner, identification is often sufficiently difficult to seriously engage the attention of those well practised in ordinary botanical work. Unfortunately there is no exactly popular work dealing with this class, and the more technical books are expensive and go further into the subject than an amateur would care to do. Still much may be accomplished by a diligent use of small means. Dr. Cooke's little book, "One Thousand Objects for the Microscope," published at one shilling, contains a brief but useful description and some illustrations of many species. Indeed, this book forms quite a *vade mecum* in every department for the play-time microscopist. The plant now to be considered does not appear in it by the name given here, but, as will presently be seen, is not entirely unnoticed.

Prasiola is perhaps one of the most common and it is certainly not the least interesting of the terrestrial algæ, if one may be allowed to use a term which is more descriptive than logical. It is found in somewhat sheltered situations on the ground, at the base of walls, fences, etc. Within a short walk of my neighbourhood there are more than half-a-dozen places where it flourishes all the year round, and may be found in greater or less abundance, according to the weather. It consists of a bright green, very thin membranous frond, varying considerably in size; a nice specimen I carefully spread out lately—no easy matter—was about three-quarters of an inch long by half an inch wide. The frond is much folded and crumpled, with the edges often lobed, and under favourable conditions growing vigorously, and producing short filaments and proliferations. Under the microscope the plant is seen to be composed of square cells filled with green protoplasm, without a nucleus; the walls are somewhat thick. The layer of cells is one deep only; they fit closely together, and are arranged sometimes in lines but more frequently in squarish areas, bounded by walls somewhat thicker than those between the individual cells. The whole forms a pretty object when nicely displayed, and has been compared by an old writer to a well laid out garden, with walks between neatly-disposed flower-beds. A half or quarter inch objective is necessary for the details.

*Prasiola* is a member of the order Ulvaceæ, to which belongs the very common and well-known seaweed, *Ulva*, sometimes called sea-lettuce or laver, and in Ireland, sloke. This is plentiful on most shores, and closely resembles a gigantic *Prasiola*, consisting of membranous fronds often many inches in length; but having two layers of cells instead of one only it is thicker and tougher. *Enteromorpha* is another genus in the same order, its frond is tubular and floats in either fresh, brackish or salt water, according to species. A plant called *Schizogonium* is usually reckoned as another genus, and will be referred to presently.

One of the most interesting facts about *Prasiola* is its persistent vitality under unfavourable conditions. Though delighting in moisture, it bears desiccation without injury, and during the two last dry summers has been found in the usual places, perfectly dry and ready to break up with a touch; yet on being placed in a saucer of water it at once absorbs moisture and becomes pliant, the green colour revives, and it is ready to start growth with renewed vigour. Specimens treated in this way and then left to dry up have revived again and again, though on some occasions left in the desiccated state, and even in the sun, for weeks at a time. Though so tolerant of drought it is not soon injured by what would seem an equal excess in the other direction, and it flourishes well and apparently indefinitely if kept actually in water. It grows quite freely in an aquarium, though generally suffering from the attacks of the various aquatic animals which feed on it readily. Even the extremes above referred to do not exhaust its adaptive capacities, for it will endure a not inconsiderable amount of salt in the water it is growing in, and, I believe—though not speaking from experience—it is sometimes found in brackish marshes. Of course freezing is a matter of indifference to such a plant, and it recovers from the process without difficulty. There is one thing, however, it does not seem capable of enduring, and that is being overgrown by grass and other small herbage. At the beginning of the wet weather we had last autumn there was a fine patch close to a fence in this district, but as the wet weather continued the grass, which the previous drought had destroyed, began to grow among the *Prasiola*, and a little later, on going to

the place for specimens, none were to be found. No doubt the taller grass had killed the whole by shutting out necessary light and air.

Sexual reproduction in *Prasiola* is quite unknown, and doubtless does not exist. Non-sexual propagation takes place by the protoplasm rounding itself off and escaping from the cells by solution of the walls, forming gonidia which have no power of spontaneous movement, being destitute of cilia, but are dispersed by water. Vegetative reproduction is very copious, as any portion separated from a frond will continue to live and grow, while the lobes and proliferations, which are produced freely at its margins under favourable circumstances, are especially liable to become detached, and will originate a new plant. It has been stated on good authority that *Prasiola* is but the adult stage of what is usually considered another plant; or, indeed, it might be said, of what is looked upon as a series of plants. The most definite is generally known as *Lyngbya*; but it would occupy too much space to enter now on that part of the subject.

I shall be pleased to forward specimens of *Prasiola*, and *Lyngbya* also, so far as available material will allow, to anyone sending address and stamp for postage.

9, *Agamemnon Road, West Hampstead, London, S.W.; February*, 1897.

(*To be continued.*)

## THE EGGS OF THE PEARLY NAUTILUS.

PROFESSOR Ray Lankester has written an interesting letter to the "Times," describing the successful search, by Dr. Arthur Willey, a friend and former pupil of his, for the eggs of the pearly nautilus. "Two and a-half years ago Dr. Willey" — says Professor Lankester — "left England for the South Seas to conduct his search. The pearly nautilus is the only living representative of the great group of extinct animals whose shells are known as ammonites. So rare were specimens of the animal itself that twenty years ago I paid £18 for two preserved in spirit. Yet they are trapped in baskets like lobster-traps by the natives of some of the Melanesian Islands and used as food. The structure of the animal is extremely curious, and an admirable account of it formed the first and in many respects the ablest scientific memoir produced by Sir Richard Owen. The nautilus is allied to the cuttle fishes, but differs from them in most interesting ways. To fully understand its structure and the mode of building up of its chambered shell it is necessary to know its young stages whilst it is growing and forming within the egg. To gain this knowledge will be a great triumph; it has been one of the few important embryonic histories not yet ascertained by the enterprise of latter-day naturalists.

"Dr. Willey proceeded first to Ralum, in New Britain, where he spent a year trapping the nautilus in seventy fathoms of water and dredging in vain for its eggs. He then tried a station on the coast of New Guinea, where he was nearly drowned by the capsize of his small craft. After passing through New Caledonia, he arrived last summer in Lifu, one of the Loyalty Islands, where nautili can be captured in three fathoms depth only. Here he constructed a large submarine cage in which he kept specimens of the nautilus, feeding them daily. On December 5th last his patient endeavours were rewarded. Some of the nautili had spawned in the cage, and thenceforward he was able to obtain abundant samples of the eggs. Each egg is as large as a grape, and is deposited separately by the mother nautilus. At present we have received but few further details from Dr. Willey, but he has doubtless by this time obtained the young in all stages of growth, and will return to England with the materials for a most important memoir.

"Dr. Willey was enabled to undertake this quest by his appointment to the Balfour studentship, founded by general subscription in memory of Frank Balfour, whose heart would have been rejoiced by the work thus carried out in his name. He was also assisted by the Government grant fund of the Royal Society. It is a legitimate source of gratification to British men of science that a successful result has followed from the application of these funds. By aid of the same funds Mr. Caldwell, twelve years ago, discovered the eggs of the Australian duck-mole and echidna and the larval stages of the remarkable fish, ceratodus, of Queensland—an animal which, like nautilus, is a survival of most ancient extinct forms. Our younger naturalist travellers have in this past year elsewhere given proof of their energy and devotion and done credit to the British name in the field of science. Mr. Spencer Moore is on his way home from Lake Tanganyika, where he has successfully studied the freshwater jellyfish and other important animals living in those waters; whilst Mr. Graham Kerr is returning from the Paraguay River with an abundant supply of the embryos of the South American lepidosiren, an exceptionally interesting fish which, until four years ago, was known by but six specimens in European museums."

# NATURE NOTES IN THE RIVIERA.

By John T. Carrington.

(Continued from page 248.)

BEHIND the Palais de Longchamp, in which is the Museum at Marseilles, described last month (*ante* p. 247), are the Zoological Gardens, which form a branch of the Jardin d'Acclimatation of Paris. They are small in extent and chiefly used for the storage of different animals which arrive at the port from tropical and sub-tropical regions. These consequently vary a good deal in numbers, both in species and individuals; for, after remaining a short period to rest and to recover from the effects of their voyages, most of them are distributed by sale to various zoological societies and private individuals. The cages allotted to birds are often very pretty when occupied by large crowds of a single species. On one occasion I saw an immense flock of several thousand specimens of the little green Australian grass paraquets, which, in the bright sunlight, made quite a dazzling sight. There are some few animals which are more permanent residents, especially in the monkey-house, where they are in excellent condition and apparently much attached to an agreeable keeper who shows much interest in them.

At Hyères, between the old town and the station, is another branch garden belonging to the Paris Acclimatization Society which cannot be called a zoological establishment in the ordinary sense. It is chiefly used as a sanatorium for the animals which are too delicate to be kept in the Paris gardens of the Society, or are unsuited to the extremes of climate which are often so sharply felt in the Metropolis of France. Occasionally one finds really interesting and rare animals which are under any circumstances worth visiting; as also are the gardens, which are beautifully situated, prettily arranged and free of admission at Hyères. At Marseilles the entrance fee is a franc, excepting on Sundays and holidays, when there is music—then it is half that sum.

At Nice—or, more correctly, in the beautiful suburb of Cimiez—is a zoological garden of not very large extent established by the late Count Tripier de Lagrange. These gardens are a favourite resort of the holiday-making Niçois, especially in summer time. They are well kept, and the animals thrive splendidly in the clear, warm, but bracing air surrounding them. The lions and tigers are fine specimens, and there is a particularly good black variety of leopard, through whose sooty coat the darker spots in the fur are barely traceable. There are several species of bears and some deer; but, unfortunately, to most of the native visitors the excellent restaurant in the grounds has greater attractions than the rarest animals. The view from the terrace in front of this restaurant is magnificent, including the torrential Valley of the Paillon which ends in high Alpine ranges backed by snow-capped peaks. On the opposite side of the valley on Mont Gros, at an altitude of about 1,200 feet above the sea, are the conspicuous buildings of the Observatory which were erected and equipped by Mons. Bischoffsheim, the rich Paris financier, Deputy of the Alpes Maritimes, and presented by him to the city of Nice; though he retains control during his lifetime. It is now a centre of meteorological as well as astronomical observation. The buildings include pavilions for the large and small equatorials, spectroscopical and physical departments, and handsome dwelling-house for the staff, which numbers about a dozen assistants, besides servants. There is also the library, which contains some seven or eight thousand volumes. The Observatory is connected with the city by telephone, it being about four miles out of town.

Near the flower market in the Rue St. François de Paule is the City Free Library (Bibliothèque Municipale) where there are some books on biological subjects, though not very modern or up-to-date in character. The student will find the MS. catalogue devoted to Science divided into sections, and he has only to ask for the book he requires when he will at once be attended to. Botanists who care to know something of the literature of their subject will also do well to visit the library of the Agricultural Society, which also includes horticulture, at No. 11, Place Garibaldi. As stated in my notes last month, Mons. J. Olivier, at the museum in Place Garibaldi, is a good botanist, and will help those in difficulties with unfamiliar plants. Mons. Olivier recommends as the best hand-book for the botanist visiting the Riviera "Flora Analytique des Alpes Maritimes," by H. Ardoino, which I believe is about five francs in price. It is not illustrated, but the descriptions are easy to understand.

There are in several parts of the Riviera biological stations more or less private in character. There was a small one at Tamaris, near Toulon, which was established with the worthy object of giving facilities to poor students for examining the marine fauna, but it does not seem to have been much patronized—if it still exists.

As a centre both for pleasure and biological investigations few places are more suitable in the

Riviera than Nice. It is a fine city of about 100,000 inhabitants, if we include the extensive suburbs. Here every taste can be gratified and every opportunity is available for long and interesting excursions for the lover of nature at all times of the year. The winter is "the season" for foreign visitors, commencing about October and lasting to the end of May and into the June following. April, May and June are the best months for the naturalist, though there is plenty to occupy him at all seasons. In winter, for the botanist, there are continuous successions of flowering plants in sheltered situations, as well as some species of land and freshwater shells for the student of malacology. The entomologist will find occupation up to Christmas and again towards the end of January, and in February forward.

The winter's rest, however, for most wild living things, whether animal or vegetable, is very apparent during January, though many of the days in that month have a temperature and sunniness like those of an English May-time. On such days one sees in the flower-scented gardens with with sunny aspect plenty of the humming-bird hawk-moths, large dragon-flies, or an occasional locust which has ventured from its winter shelter. Hibernating Admiral butterflies (*Vanessa atalanta*) and an occasional Clouded Yellow (*Colias edusa*) also gladden English eyes. It is not until after carnival time, from which most events date at Nice, that one expects to find the flight of new butterflies to commence, which begins with *Pieris daplidice*, and the commoner whites, the latter first appearing about the middle of February.

On the hill-sides of the lower ranges of the Maritime Alps that come down close to the sea near Nice there are many walks where one may see nature at its wildest, though so easy of access from where men's artifice and luxury is nowhere more apparent. These rambles are facilitated by the aid of the numerous country omnibuses which run out of the city in various directions at wonderfully cheap fares. By their aid much time and fatigue, are saved as one arrives at the foot of some mountain path where collecting or observation may at once commence. The South of France Railway, also, is a great boon to excursionists from Nice. It is a queer narrow-gauge line which winds about through mountain passes, over lovely valleys and along hill sides, through some of the most beautiful scenery in southern Europe. This line, having been constructed largely in view of military requirements, is very deliberate with regard to its speed and service of trains. They are not frequent and very slow. The country is so eminently suited, however, for the naturalist who travels by the line that he forgives all its imperfections in his thankfulness for being in such delightful localities served by this little railway.

Among the earliest plants one sees in bloom in winter, commencing in November, not counting the many stragglers from the previous autumn, is the little spotted arum (*Arum italicum*). Its greeny-white flowers, with many brown spots and streaks, are abundant nestling among its glaucous-green leaves, reminding one of inverted pitcher plants. It is a striking plant, the more so because so much in evidence when others are less common. It occurs nearly everywhere—on hedge banks, on waste places, and even on mountain sides up to considerable altitudes. *Arum maculatum*, so familiar to lovers of country lanes in England, grows immense leaves in the neighbourhood of Nice. A locality down by the river Var possesses some beds of these plants which are magnificent in foliage, both as regards size and markings. The leaves are in full beauty all through January and early February, though the flower-spikes are not then found.

Leaf variation forms a most interesting subject for investigation in Southern France during winter. There are many strange varieties among plants familiar to English people, both as regards shape and colouration. Black markings often appear with considerable intensity on the upper sides of certain plants. This is especially notable on the lesser celandine (*Ranunculus ficaria*), which produces a handsome variety. The local form of dandelion is very peculiar, having deeply-indented leaves, with broad apex divided into two lobes. This is common on the Castle Hill at Nice.

On mountain sides one recognises the fragrant scent of the wild rosemary, which is abundantly in flower throughout the winter from before Christmas to late in February. It affects the roughest rocky sites where there is hardly any soil to support its straggling roots. It is a cheerful shrub when in full bloom, reminding one of English cottage gardens in May-time. In sheltered gardens near the city, at Christmas, one sees the lavender bushes also covered with flower-spikes ready to burst into bloom just as soon as the nights get warm enough to retain the stored heat of the day's sunshine. This shrub grows wild on the dry hill-sides, where it flowers much later than in the gardens.

About the middle of January the first of the large purple anemones appear as a common garden weed, and on mountain sides. These later become abundant, as also a smaller mauve species, about twice the size of common white wood anemones. Many cultivated varieties of these plants are sold in the market in February. At the end of January, whilst shell-hunting with Colonel Beddholm, of Putney, on Mont Gros, above Villefranche and near the Corniche Road, I found some lovely blue crocuses growing wild among the rocks.

# ARMATURE OF HELICOID LANDSHELLS AND NEW FORMS OF PLECTOPYLIS.

By G. K. Gude, F.Z.S.

(*Continued from page* 246.)

PLECTOPYLIS *smithiana* (1) (figs. 38*a-d*). I also found two specimens in the Theobald collection of the British Museum, labelled *Plectopylis brachyplecta*, which, in spite of some external resemblance to that species, presented sufficient differences to lead one to suspect that they were distinct, and on opening one of them I found that the difference in the armature confirmed this suspicion. In basing a new species upon them, I have much pleasure in dedicating it to Mr. Smith, whose permission to open the shell enabled me to investigate the matter.

*Plectopylis smithiana* differs from *P. brachyplecta* in being darker and larger. The ribs are coarser and the whorls more convex; the last whorl is not angulated above, and it widens more towards the aperture. The peristome is less thickened and more reflexed, and the ridge of the parietal callus less stout but more raised, while the umbilicus is wider and much more shallow. The horizontal parietal fold deflects more at the aperture and there is only one vertical plate (see fig. 38*d*), which is crescent-shaped, with the convex side towards the aperture; on its anterior side, in place of a second vertical plate as in *P. brachyplecta*, are found two elongated, oblique, converging denticles, one above and one below. The palatal armature is similar to that of *P. brachyplecta*. Fig. 38*d*, which shows the parietal wall, is from one of the specimens in the British Museum. Figs. 38*a–c* are drawn from a specimen, labelled Attaram, obligingly lent to me by Miss Linter, of Arragon Close, Twickenham, who informs me that she received it from Mr. Theobald. This was also labelled *P. brachyplecta*, but I have no hesitation in referring it to the new species. It measures—major diameter, 26 millimetres; minor diameter, 21 millimetres; axis, 9 millimetres.

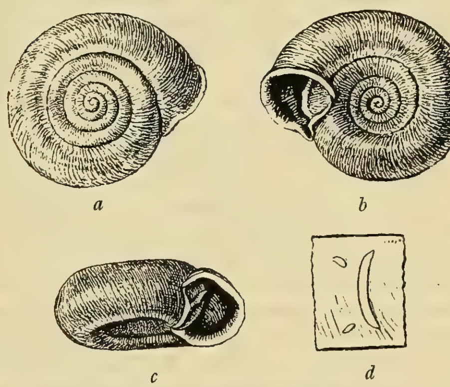



Fig. 38.—*Plectopylis smithiana.*

*Plectopylis plectostoma* (figs. 39*a-c*) was first described by Mr. Benson in the "Journal of the Asiatic Society of Bengal," v. (1836), p. 351; but from additional material received, which enabled him to examine the armature, he subsequently published an amended description ("Annals and Magazine of Natural History" (3), v. (1860), p. 247). The species appears to be of fairly wide distribution, for, in addition to the original locality, Darjeeling, Mr. G. Nevill (Handlist (1878), p. 71) records the following habitats: Burma—Bassein and Arakan; Assam — Sylhet, Khasia and Naga Hills; while Lieut.-Colonel Godwin-Austen mentions specimens from the Dafla Hills, in Assam. The shell has been figured in Reeve's "Conchologia Iconica," t. 129, f. 782 (1852), in Martini und Chemnitz's "Conchylien Cabinet," 2nd ed. i., t. 64, ff. 19–21 (1853), and in Hanley and Theobald's "Conchologia Indica," t. 13, f. 2 (1870). The armature was figured by Lieut.-Colonel Godwin-Austen in the "Proceedings of the Zoological Society," 1874, t. 73, f. 2. After looking over a number of shells in various collections, I found that two different forms, one with and one without a horizontal fold given off from the parietal vertical

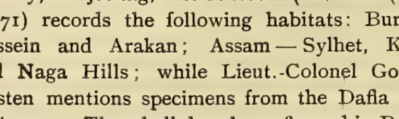
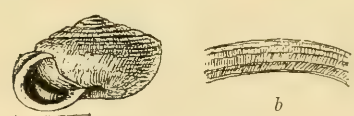



Fig. 39.—*Plectopylis plectostoma.*

(1) *Plectopylis smithiana*, n. sp. (figs. 38*a-d*).—Shell dextral, discoid, widely umbilicated, rufous brown, coarsely and regularly ribbed, with scarcely visible microscopic sculpture above, but strongly decussated with spiral lines below, suture impressed. Whorls 6, convex, slowly increasing, the last rapidly widening towards the aperture, not angulated above, shortly descending in front. Aperture sub-triangular; peristome light brown, a little thickened and reflexed, the margins converging; parietal callus with a strongly raised flexuous ridge, separated from both margins of the peristome. Umbilicus very wide but shallow. Parietal wall, with an entering flexuous horizontal fold, united to the ridge at the aperture, and at one-third of the circumference from the aperture with one crescent-shaped vertical plate, which has two small denticles, one above and one below, on the anterior side. Palatal folds 6, the first and sixth thin and horizontal, the other four short, broad and oblique.—Major diameter, 27 millimetres; minor diameter, 21 millimetres; axis, 10 millimetres.—Habitat, Attaram, Burma.—Type in the British Museum.

plate, were inclnded under this name, and it became therefore necessary to decide which of the two conformed to Mr. Benson's type, the specimens of which I knew to be in the Museum at Cambridge. Through the kindness of Mr. Harmer I have now been able to examine the type specimens, and I am pleased to have an opportunity of figuring one of them. Although Mr. Benson's reference to the armature in his amended description, "lamina 1 parietali verticali, simplici, lamellis nullis munita," inclined me to believe that the form without the horizontal fold was the true *P. plectostoma*, the examination of Mr. Benson's type shells does not bear out this view. All the shells of the Benson collection labelled "Darjeeling," which are without doubt Mr. Benson's types of this species, belong to the form *with* the horizontal fold, and this form must therefore be taken as the true *P. plectostoma*. Mr. Fulton obligingly sent me twenty-five specimens of each form for inspection, which, in addition to the specimens in my own and other collections, have enabled me to obtain a fairly accurate idea as to the constancy of both forms, the differences of which will be discussed further on. *Plectopylis plectostoma* is sinistral, disk-shaped, more or less dark corneous *brown*, *opaque*, with a conical spire, deeply but somewhat *narrowly* umbilicated; it is composed of seven narrow, closely and regularly coiled whorls, which increase slowly and are a little rounded *above* and *below*; the last whorl scarcely widens near the aperture and shortly descends in front. The shell is radiately plicate and *granulated* by coarse spiral sculpture above, and decussated below, while the cuticle is *thick* and distinctly raised into distant transverse *plaits*. *Five* lines of *scattered* hairs, placed on *raised ridges* pass round the whole length of the body-whorl, the first on the periphery, the second a little below it, the third, fourth, and fifth wider apart, the last being close to the umbilical angulation. The aperture is *broadly* ear-shaped; the peristome is whitish or rufous, thickened and reflexed, the upper margin *widely* arcuate; the raised ridge of the parietal callus is *scarcely* curved, and not perceptibly separated from the margins of the peristome. The parietal armature consists of a strong vertical plate which gives off anteriorly a strong, obliquely ascending support below and a *horizontal fold* above, slightly notched at the junction; on the posterior side of the plate are found two minute denticles, one near the upper and one near the lower extremity. A *single*, very short, free horizontal fold is found below the plate. The palatal armature consists of, first, a thin, short, horizontal fold close to the suture; secondly, a thin but longer and broader fold opposite the upper extremity of the vertical parietal plate, slightly indented in the middle, with the posterior extremity shortly reflected at an angle of 100°; thirdly, a similar shortly reflected horizontal fold, notched in the middle, and then suddenly deflected vertically; fourthly, a short, thin, broad fold, which has posteriorly to it an almost vertically deflected short broad fold; fifthly, a similar short horizontal fold, which has also posteriorly a short, broad, descending fold, a little more oblique than the previous one; and sixthly, a very short and narrow horizontal fold near the lower suture, situate below the space between the two preceding series. Fig. 39*a* is from one of the type specimens; it measures, major diameter, 9 millimetres; minor diameter, 8 millimetres; axis, 5 millimetres. Two other of these specimens measure 8·5 millimetres, and one 8 millimetres in diameter. Fig. 39*b*, showing the parietal wall with its armature by itself, and fig. 39*c*, showing the inside of the outer wall with its palatal folds, are from a specimen in my collection, from the Khasia Hills; it measures — major diameter, 8·5 millimetres; minor diameter, 7·25 millimetres; axis, 4·5 millimetres. The specimens of this form submitted to me by Mr. Fulton, all from the Khasia Hills, range from 8 to 9 milli-



*a* *b*

Fig. 40.—*Plectopylis plectostoma* var. *tricarinata*.

metres in diameter. An immature specimen in my collection has the armature complete, as in the full-grown specimens, but the palatal folds are a little shorter; traces of the previous palatal folds, one quarter of a whorl further back, can distinctly be seen through the shell-wall.

*Plectopylis plectostoma* var. *tricarinata* (1) (figs. 40*a* and *b*). A tablet in the McAndrew collection contains five specimens, labelled "*Plectopylis plectostoma*, Bengal, Benson coll.," two of which are distinct from the type and appear to be worthy of a varietal name. Besides being larger and more conical than the type, they are also distinctly keeled at the periphery and have three distinct raised ridges on the upper side, revolving as far as the fourth whorl. I name this form *Plectopylis plectostoma* var. *tricarinata*. The entire shell is shown, enlarged, in fig. 40*a*, while a portion of the last whorl, more enlarged, is shown in fig. 40*b*. The armature is identical with that of the type.

(1) *Plectopylis plectostoma* var. *tricarinata*, n. var. (figs. 40*a* and *b*), differs from the type in being larger, in having the periphery acutely keeled, and in having three raised ridges between the periphery and the suture, revolving as far as the fourth whorl.—Major diameter, 10 millimetres; minor diameter, 9 millimetres; axis, 6 millimetres.—Habitat, Bengal. —Type in the McAndrew collection of the University Museum of Zoology, Cambridge.

*Plectopylis affinis* [1] (figs. 41*a*–*d*), from the Khasia Hills, has hitherto been confused with *Plectopylis plectostoma*, but it differs in being larger and much paler in colour, in having four instead of five rows of hairs, which are not placed on raised ridges as in

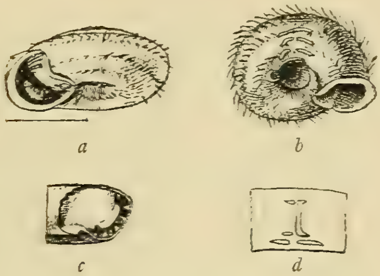



Fig. 41.—*Plectopylis affinis.*

that species; the cuticle is much thinner and not plaited, while the spiral sculpture is less coarse above and scarcely perceptible below, where the shell is also more shining than in *P. plectostoma*. The shell is translucent and the armature is distinctly visible through its wall, while the aperture is more narrowed laterally and the upper margin of the peristome is less arcuate, being a little inflected. The umbilicus is also wider and scarcely angulated, while the base is much more flattened. The ridge of the parietal callus is more raised and more curved. The parietal armature consists of a vertical plate with a very short support anteriorly at the upper and lower extremities, but without the horizontal fold above as in *P. plectostoma*. The two denticles on the posterior side are larger and more elongated, and below the vertical plate are two short, thin, horizontal folds in a line with each other (see fig. 41*d*, which shows the parietal wall by itself; and fig. 41*c*, which shows both armatures from the posterior side). The palatal armature is similar to that of *P. plectostoma*, but the posterior portions of the third, fourth and fifth folds, instead of being straight and almost vertical, are crescent-shaped and oblique (see fig. 41*b*, which shows the palatal folds as they appear through the shell-wall); an additional semi-circular fold, posterior to but a little above the fifth fold, occurs in this specimen; this, however, I have not observed in any of the other specimens. Fig 41*a* shows the entire shell enlarged. My specimens were obtained from Mr. Fulton some years ago; the twenty-five further specimens from the same locality, sent to me for inspection by him, range from 9 to 11 millimetres in diameter. Two immature specimens in my collection are composed of five and a-half whorls; one of these has the immature barriers complete, but the palatal folds are very short and the posterior oblique portions of the fourth and fifth folds are almost straight instead of crescent-shaped; externally a slight trace of previous folds can be discerned; in the other specimen the last immature folds are similar to those of the first specimen, but the remains of a previous set is in a less advanced stage of disintegration.

(*To be continued.*)

[1] *Plectopylis affinis*, n. sp. (figs. 41*a*-*d*).—Shell sinistral, somewhat *widely* umbilicated, disk-shaped, *pale yellowish* corneous, *translucent*, radiately plicate, *decussated* by spiral lines above, *smoother* and *shining below*. Whorls 7, narrow, increasing slowly, the last *widening* towards the aperture, and descending a little in front, rounded above, *flattened* below; *four* lines of soft pilose hairs pass round the whole length of the body-whorl, the first on the angulated periphery, the second a little below it, the third midway between the second and fourth, which is near the umbilicus. Aperture ear-shaped, elongated *vertically*; peristome white, thickened and reflexed, upper margin a little *depressed*; the raised *flexuous* ridge on the parietal callus is separated from the margins by a slight notch. Umbilicus deep and moderately *wide*. The parietal armature consists of a vertical plate with two short supports anteriorly, one above and one below, and two elongated denticles posteriorly, one above and one below; *two* free, short, horizontal folds in a line occur below the vertical plate. The palatal armature is composed of six folds, the first and sixth short, thin and horizontal, the others longer and broader; the second a little indented in the middle, with the posterior termination raised obliquely; the third is notched in the middle, and deflects obliquely posteriorly; the fourth and fifth are in two series separated by a short space, the anterior portion straight and horizontal, the posterior portion crescent-shaped and obliquely descending.—Major diameter, 10 millimetres; minor diameter, 9 millimetres; axis, 5·5 millimetres.—Habitat, Khasia Hills, Assam.—Type in my collection.

Oldhaven Beds.—Mr. William Whitaker first proposed, in 1866, the name of Oldhaven (and Blackheath) Beds for those singular accumulations of pebble-beds which occur between the London clay and the Woolwich and Reading beds, and which had previously been classed by Professor Prestwich as the basement-bed of the London clay. The pebble-beds are easily recognized in consequence of the well-worn condition in which the pebbles are left after deposition. As an explanation of the fact that there is rarely anything like a sub-angular flint to be seen in these beds, "one is led to infer that they must have been deposited some way off the shore, as a bank to which no flints could get until after having been long exposed to wearing action." This method of their origin has been repeated in various books on the subject, but it does not seem to me that it altogether satisfactorily accounts for the presence of vegetable remains that are occasionally found in the mass of pebbles. Last year I saw a layer of about six inches of peaty matter intercalated between identical pebble-beds, all resting upon Woolwich beds. I further observed *Melania inquinata* and *Cyrena flumenalis*, in a smaller pit at Charlton, just east of the road leading from Lower Road up to Charlton Church. The oscillations of surface which Mr. Whitaker thinks may have marked the period I would suggest may in this case have actually brought the sea-bottom above the sea-level, and caused a growth of vegetation that was afterwards thrown down by the incoming sea on the subsidence of the area.—*Edward A. Martin*, 69, *Bensham Manor Road, Thornton Heath.*

# THE MIGRATION OF BIRDS.

IT is only by a careful and systematic record of trustworthy observations that we may expect to unravel the mystery of bird migration. Most writers on the subject have hitherto depended upon desultory and scattered records with which to found theories; some of them, though fantastic enough to please the most ardent lover of the wonderful, no longer need occupy the attention of the serious student of nature. As is well known, the British Association for the Advancement of Science some time ago appointed a committee to collect records from lighthouses and lightships around our coasts. With the approval of the Board of Trade a systematic record of bird visitants to outlying lights during migration times has been collected by the keepers of lighthouses and lightships. The birds, attracted like moths to the lights, often fall stunned or dead in great numbers round the lanterns. These are picked up by the attendants and noted, identification being secured by cutting off one of the wings and attaching it to the record. At some lights in the main line of migration on still dark nights multitudes of birds are killed in this manner, thus giving ample material for studying the direction of flight, the different species passing and their estimated numbers.

We have been favoured by the Honorary Secretary to the Committee above referred to (Mr. John Cordeaux) with a report submitted to the meeting of the British Association at Liverpool last autumn. It consists of an important digest of the observations made from 1880 to 1887. This Committee consists of Professor Newton (Chairman), Mr. John Cordeaux (Secretary), Mr. John A. Harvie-Brown, Mr. R. M. Barrington, Mr. W. Eagle Clarke and the Rev. E. P. Knubley. As many of our readers are interested in this subject, we have pleasure in quoting the leading conclusions to which the Committee have arrived. These extracts will be found the more seasonable as the spring migration will shortly be in full flow.

"As has been before stated at meetings of the Association, this Digest is the work of one of their number, and the remaining members of the Committee have to record their deep sense of the obligation under which they lie to Mr. William Eagle Clarke, of the Science and Art Museum, Edinburgh, for the assiduity with which he has so long laboured on the enormous task he undertook, and to congratulate him on the success with which he has overcome the countless difficulties it presented." . . .

"It cannot be doubted that henceforth, as regards the British Islands, there is now established a firm basis on which may rest a sound and proper conception of many of the phenomena of British migration, for this Digest contains a plain statement of ascertained facts, and is wholly free from theory or speculation of any kind. Thus it will be found to differ from almost everything that has hitherto been published on the subject. In saying this much your Committee would, however, guard themselves from the inference that the business is exhausted: on the contrary, a very great deal more is yet to be learned from a further examination of the observations which have been collected at the lighthouses and lightships, while the whole subject of inland migration is untouched. Whether it will be possible for the Committee to proceed further must entirely depend on the action of the Association; but they may say that Mr. Clarke, so far from being deterred by the magnitude of the task with which he had so successfully grappled, is willing to work out the details of migration for each of the species to which the observations refer, and has even already begun to do so; and it is to be hoped that he will receive some encouragement to continue such useful work. And the Committee may remark that the very considerable funds that private generosity has placed at their service are now exhausted.

"Though on the present occasion the thanks of the Committee are so certainly due to Mr. Clarke, they feel that, while presenting what may be their final report, they must again acknowledge their indebtedness to all who have helped them in prosecuting their inquiries; first, to the Master and Elder Brethren of the Trinity House, the Commissioners of Northern Lights, and the Commissioners of Irish Lights; but more especially to the men of the several lighthouses and lightships, without whose cheerful and intelligent co-operation nothing could have been done."

Following this comes Mr. Clarke's conclusions:

"In presenting this Digest of the results obtained concerning the migration of birds, as observed at lighthouses and lightships around the coasts of the British Islands, during the years 1880-1887 inclusive, to the Committee appointed by the British Association for the investigation of that subject, I beg to offer an explanation regarding the lapse of time that has taken place between my appointment and the completion of the work. In a word, this has been entirely due to the magnitude of the undertaking.

"I was instructed to base the Digest upon an examination *de novo* of the whole of the information furnished to the Committee during the eight years of its active existence. Thus the whole of the data required to be reduced to order before it was available for the purposes of the Digest. Moreover, at the outset there presented itself for consideration an extremely perplexing problem, namely: how to treat or arrange such a vast array of facts on a systematic plan which would render them comprehensive and at the same time suited to the inquiry in all its varied aspects. It was not until a number of abortive attempts had been embarked upon that a plan was devised which met the very special requirements of the case. The scheme finally adopted took the form of a schedule. This was designed to show graphically, for each species during each month, (1) on what day; (2) coast; (3) station; (4) in what numbers; and (5) whether during the day or night the particular species was observed during the particular month and year. It is needless to remark that

such a systematic tabulation of at least one hundred thousand records, culled from several thousands of forms filled in by the light-keepers, in each of which species were numerous and the dates wide ranging, proved to be both a long and laborious task.

"The results now presented are, for the first time, based upon the examination of the *whole* of the information communicated to the Committee *for all the coasts:* a most necessary condition, for from such a complete and comprehensive examination alone could it be at all possible to obtain results worthy of the inquiry, and an accurate knowledge of the nature of the various phenomena associated with the migration of British and Irish birds. Indeed, it is now in our power to declare that it is quite impossible at certain seasons to distinguish between the widely different immigratory and emigratory movements without due examination and consideration of the whole of the observations, a fact the non-realization of which has been fruitful of much misconception and of many misleading statements in the past.

"It is manifestly impossible to conduct an inquiry into the migration of birds over the entire British area, or even of the smallest section of it, under other than imperfect conditions; a hundred circumstances are against such a desirable consummation. Even if a party of trained ornithologists were placed at each station, it would fail to secure anything like perfect results. . . .

"The object of the inquiry was to obtain full and trustworthy information in connection with the migratory movements of birds as observed on our coasts, and not to solve problems connected with the causes of the phenomena, the evolution of the migratory instinct, or other purely theoretical aspects of the general subject.

"As regards the importance of this investigation, it must be borne in mind that the observers were most favourably stationed for witnessing migration in its various phases, and that such a voluminous and complete set of observations has never been amassed at any previous period in the history of the study of bird-migration. Its special nature can only be fully appreciated when it is realized that in order to study the phenomena of bird-migration in the British Islands it is necessary that the data upon which any deductions may be satisfactorily or safely founded should be based upon observations taken synchronously at stations encircling the entire coasts. This cardinal and most important condition has been attempted and accomplished for the first time, either in this or any other country, through the labours of the Committee.

"The meteorological aspect of the subject has received very careful attention, and with interesting and important results. In connection with this portion of the work, the 'Daily Weather Reports' issued by the Meteorological Office have been consulted and correlated with the data relating to the migratory movements for each year of the inquiry.

"Finally, I may state that the results now communicated are based absolutely upon the records obtained by the Committee; and also that I have approached the subject with an open mind and without preconceived ideas. I have considered this not the place for theory, but for the establishment of facts, and for deductions drawn from a direct study of the observations placed in my hands.

"The migration of birds as observed in the British Islands is a very complex phenomenon; more so, perhaps, than in any other region of the globe. This is readily accounted for.

First, the geographical position of the British Islands is eminently favourable. Placed as our Isles are, between South-western Europe and the Scandinavian peninsula, Iceland and Greenland, they lie directly in the course of the legions of migratory birds which annually make a double journey between their northern summer and their southern winter quarters. For these birds of passage our shores form not only a main and much-accustomed highway, but afford convenient resting-quarters.

"Secondly, our islands have a vast bird-population of their own, and the majority of these birds belong to purely migratory species. Some of them are either summer visitors from the southern regions or winter visitors from Continental Europe, Iceland, etc.

"Thirdly, many individuals of species which are sedentary in our islands are strictly migratory. This is especially the case in the more northern and elevated portions of the British area: hence these species are said to be 'partial migrants.'

"Finally, our remarkably variable climate is a constant element of disturbance, causing much migration within the British area itself and intermigration with the islands off our western coasts, especially with Ireland. This occurs during the winter months, and hence these migrations will be alluded to in this report as 'winter movements.'

"The above important considerations and influences result not only in much migration of a varied nature being witnessed on our shores, but often, through a combination of meteorological conditions, in more than one movement being observed in progress simultaneously, adding much further intricacy to an already complicated series of phenomena.

"Having thus shortly described the British Islands as a highway for and as a source of migration, having mentioned the nature of the various movements observed on our coasts, and having alluded to the influence exerted by climatic conditions upon the bird-population of our area, I may now proceed to discuss the main results obtained through the inquiry under the following sections: (1) Geographical, (2) Seasonal and (3) Meteorological."

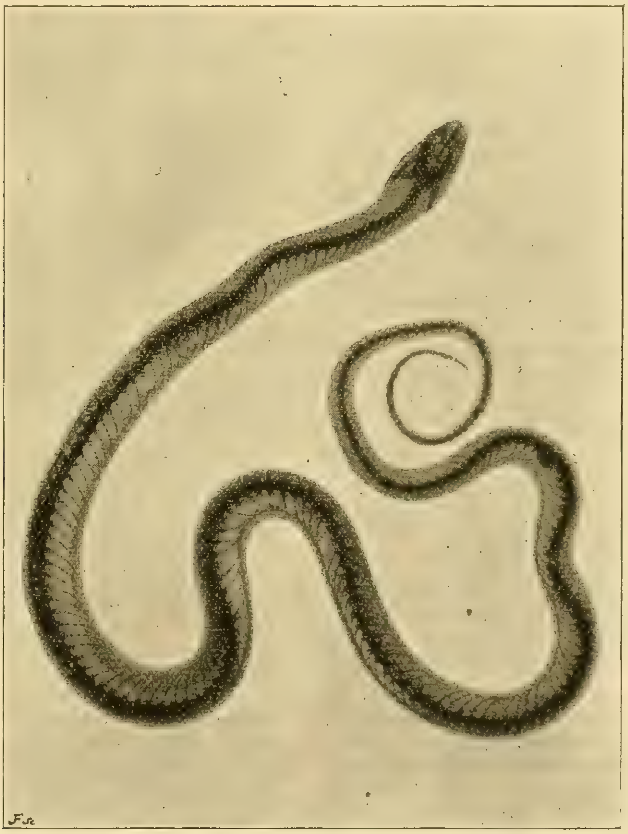
(*To be continued.*)

MARINE NATURAL HISTORY.—Like Dr. Tatham (*ante* p. 255), I notice with regret the absence from SCIENCE-GOSSIP of notes on Marine Biology. Some years ago, as opportunity occurred, I did a little work in it myself, and always found it most fascinating and productive of fresh objects for examination. I should be glad, now my facilities are lessened, to know what others may have to relate of their experiences. Surely there must be many readers of SCIENCE-GOSSIP dwelling at the sea-side who could gratify their less fortunate town brethren with an account of their finds. Even short notes are interesting and useful, and are certain to be welcomed by the Editor, for has he not frequently told us that it is just this section of his paper—which ought to be so easily and fully supplied—that he has difficulty in filling.—*Jas. Burton*, 9, *Agamemnon Road, West Hampstead.*

# BOOKS TO READ

*Short Studies in Physical Science.* Mineralogy, Chemistry and Physics. By VAUGHAN CORNISH, M.Sc. 230 pp. 8vo; illustrated. (London: Sampson Low, Marston and Company, Limited, 1897.) Price 5s.

There are sixteen chapters in this book, three being devoted to mineralogy, six to chemistry, and seven to physics. Some have appeared already in serial literature, but for the most part they are new. Some of the chapters in chemistry are more or less historical, dealing with Elements and Atoms and Chemical Classification. In Chapter v. Menaeléeff's System is discussed. The illustration to the chapter is a portrait of that eminent Russian chemist. Another is a reproduction of an X ray photograph, by Newton and Co., of Fleet Street, of an English grass-snake, as an example of pictures to be taken by the agency of Röntgen ray photography, Chapter xiv. dealing with the subject. We reproduce the latter of these illustrations, by permission of the publishers, to show the high tone of the work and its production. We can cordially recommend the book, especially to those students who know something of the subjects treated by Mr. Cornish in its pages.



RÖNTGEN RAY PHOTOGRAPH OF ENGLISH GRASS-SNAKE.
(From Cornish's "*Short Studies in Physical Science.*")

*A Handbook to the Order Lepidoptera.* By W. F. KIRBY, F.L.S., F.E.S. Vol. 3, Part i. Butterflies concluded—Hesperiidæ, Moths. 308 pages 8vo, illustrated by 27 Coloured Plates and numerous figures in the letterpress. (London: W. H. Allen and Co., Limited, 1897.) Price 6s.

This is the third of the proposed five volumes on Lepidoptera, to be included in "Allen's Naturalists' Library," the former two being noticed in this magazine (N.S., vol. i., p. 256; vol. iii., p. 45). The present one contains the last family of the butterflies—Hesperiidæ, and the first twenty-six families of Moths. Nomenclature again has received some additions and alterations in this book, but may be followed by the synonymic references at the commencement of the description of each species referred to. For instance, *Callimorpha hera* gives way to Hubner's *Euplagia* and *quadripunctaria* (Poda, Mus. Græc., p. 89, 1761). Linnæus named this species *hera* in 1767, so Poda's other name has priority. The handsome coloured plates in this volume make a brave show.

# SCIENCE GOSSIP

Dr. Arthur Auwers, the Berlin Astronomer, has been awarded a gold medal by the German Emperor.

The German Anthropological Society have elected Dr. Rudolf Virchow as President for the year 1897.

M. Gaillot has been appointed sub-director of the Paris Observatory in place of M. Loewy who is now director.

At the Botanic Gardens, Buitenzorg, Java, a new research laboratory is to be erected. The Government of Holland have contributed $6,000 towards the expenses.

Dr. Rudolf Mewes has undertaken the direction of a German Antarctic meteorological station, which is to be established in Victoria Land. It will be in connection with the German South Polar expedition.

Lady Prestwich is collecting material for a biography of the late Sir Joseph Prestwich, and will be glad if friends will forward to her any letters they may possess. They will be at once copied and carefully returned.

Sir Robert Ball has been nominated as the new President of the Royal Astronomical Society. At their meeting of February 12th a gold medal was awarded to Professor Barnard for his numerous contributions to Astronomy.

We regret to have to record the death of Sir Spencer Wells, who passed away early in February. He was President of the Royal College of Surgeons from 1882-83, and did good service both to medical science and humanity.

The Council of the Royal Society have invited Professor C. S. Sherrington, F.R.S., Professor of Physiology in University College, Liverpool, to deliver the Croonian Lecture for this year on April 1st. The subject will be "The Spinal Cord and Reflex Actions."

Professor Lippmann has been awarded the Progress medal of the Royal Photographic Society for his discovery of the process of producing photographs in natural colours by the interference method. Since the establishment of the Society in 1878 only ten medals have been awarded.

On February 16th the Marquis of Salisbury received at the Foreign Office a deputation of representatives of science, who asked the Government to establish a national physical laboratory at a cost of £30,000 for buildings and £5,000 a year for maintenance. Lord Lister introduced the deputation, as President of the British Association.

In "Nature" for February 18th there is an article by Mrs. G. C. Frankland on Dr. Yersin's discovery of the plague virus and its anti-toxin. That the most remarkable therapeutic value attaches to the anti-plague serum as now elaborated at the Institut Pasteur, in Paris, is shown by the success which has recently followed its application in undoubted cases of plague at Amoy. Dr. Yersin is now Director of a Pasteur Institute at Nha-Trang, in Annam.

The "Bulletin" of the University of Wisconsin for 1897 is a carefully prepared work, entitled "Analytic Keys to the Genera and Species of North American Mosses," by Charles Reid Barnes, Professor of Botany, revised and extended by Fred De Forest Heald. A large number of new species have been added to the already existing lists.

During the visit of the President of the French Republic to the Pasteur Institute on February 10th, Dr. Roux was able to show him his experiments in the cultivation of the plague microbe. Dr. Roux stated that the microbe is easily destroyed by antiseptics and by a temperature of 140 degrees. He added, however, that this bacillus retains its vitality in the soil and to this is due the epidemics of the eastern countries.

We are asked to bring before the notice of our readers a work shortly to be published by Messrs. Taylor Bros., Leeds, on "Wild Bird Protection and Nesting Boxes," by John B. B. Masefield. The work will contain, amongst other items of useful information, "A full list of the Orders made under the Wild Birds Protection Acts on the application of County Councils, with the names of the species protected." This will be very useful to collecting ornithologists.

Mr. E. Wheeler, of Clifton, Bristol, sends the following cutting from "Pearson's Weekly" as an instance of the "schoolmaster abroad" as far as natural history is concerned. Imagine a caterpillar depositing eggs! "The female of one species of caterpillar tears off the fur from the extremity of her abdomen to make a soft bed for her eggs and to preserve them from the cold. Yet she never sees her young, for after she has accomplished the task of laying the eggs the caterpillar invariably dies."

Mr. Charles G. Barrett, F.E.S., records in the "Irish Naturalist" the capture, by Mr. W. F. de V. Kane, of several specimens of *Platyptilia tesseradactylus*, L. (Fischeriz), a "plume" moth not previously known to occur within the limits of the United Kingdom. The specimens were taken by Mr. Kane and the Hon. R. E. Dillon near Clonbrock and elsewhere in the County of Galway. The moth is much like *Platyptilia gonodactylus*, the species found among *Tussilago farfara*, but less than one-half its size.

The Geological Society will award its medals and funds for this year as follows: the Wollaston Medal to Mr. W. H. Hudleston; the Murchison Medal and part of the Fund to Mr. Horace B. Woodward; the Lyell Medal and part of the Fund to Dr. G. J. Hinde; the Bigsby Medal to Mr. Clement Reid; the proceeds of the Wollaston Fund to Mr. F. A. Bather; the balance of the proceeds of the Murchison Fund to Mr. S. S. Buckman; and the balance of the proceeds of the Lyell Fund to Mr. W. J. Lewis Abbot and Mr. J. Lomas.

The Council of the Royal Meteorological Society have arranged to hold, in commemoration of the Queen's Diamond Jubilee, at the Institution of Civil Engineers, Great George Street, Westminster, from March 16th to 19th, an exhibition of the meteorological instruments in use from 1837 to 1897, and of diagrams and photographs illustrating them. The Council will be pleased to receive, not later than March 1st, lists of articles contributors are willing to exhibit and an estimate of the space required. Address, the Assistant Secretary, 22, Great George Street, S.W.


CONDUCTED BY FRANK C. DENNETT.

| | March. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 8 | 6.31 a.m. | 5.51 p.m. | 23.17 | 4° 40′ S. |
| | 18 | 6.9 | 6.8 | 23.53 | 0° 44′ |
| | 28 | 5.46 | 6.24 | 0.30 | 3° 12′ N. |
| | | *Rises.* | *Souths.* | *Sets.* | |
| *Moon* | 8 | 7.36 a.m. | 3.40 p.m. | 12.0 p.m. | |
| | 18 | 6.7 p.m. | 12.8 | 5.38 a.m. | |
| | 28 | 4.7 a.m. | 8.38 a.m. | 1.20 p.m. | |

| | | Souths. h. m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 8 | 10.59 a.m. | 2″ 7 | 22.4 | 14° 2′ S. |
| | 18 | 11.22 | 2″ 5 | 23.7 | 8° 4′ |
| | 28 | 11.50 | 2″ 5 | 0.15 | 0° 8′ |
| *Venus* | 8 | 2.52 p.m. | 15″ 3 | 1.58 | 16° 9′ N. |
| | 18 | 2.39 | 17″ 7 | 2.24 | 19° 36′ |
| | 28 | 2.18 | 20″ 6 | 2.43 | 22° 6′ |
| *Mars* | 8 | 6.27 | 3″ 9 | 5.34 | 25° 43′ N. |
| | 18 | 6.7 | 3″ 6 | 5.53 | 25° 43′ |
| | 28 | 5.48 | 3″ 3 | 6.14 | 25° 34′ |
| *Jupiter* | 18 | 10.32 | 20″ 3 | 10.20 | 11° 51′ N. |
| *Saturn* | 18 | 4.8 a.m. | 8″ 1 | 15.56 | 18° 9′ S. |
| *Uranus* | 18 | 3.59 | 1″ 7 | 15.47 | 19° 42′ S. |
| *Neptune* | 18 | 5.21 p.m. | 1″ 2 | 5.7 | 21° 30′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | Mar. 3 | 11.56 a.m. | *1st Qr.* | Mar. 11 | 3.28 p.m. |
| *Full* | „ 18 | 9.28 p.m. | *3rd Qr.* | „ 25 | 12.0 a.m. |

SUN.—Spots of considerable size are showing themselves at short intervals. Early in January a large spot visible to the naked eye crossed the disc. A large spot was also visible early in February.

MERCURY is a morning star, forming a triangle with δ and γ Capricorni at the commencement of the month, and travelling through Pisces into Aries. Never well situated for observation. It rises 37m. before the sun on March 1st.

VENUS is a magnificent evening star, attaining its greatest brilliancy on the evening of the 23rd. Its spots are difficult owing to its brightness. It sets after 10.15 p.m. all the month.

MARS is still decreasing in apparent diameter, but is still in good position. At the beginning of the month it is a little south of β Tauri, 2nd-magnitude, and on the 27th north of η and μ Tauri. It sets about 3.19 a.m. on the 1st, and about 2.15 at the end of the month.

JUPITER is in splendid position all night, in Leo, retrograding from just north of the 4th-magnitude ρ to a few degrees east of Regulus, α Leonis.

SATURN does not rise until near midnight throughout the month, away to the south-east. It is situated a little north-west of β Scorpii.

URANUS is nearly close to the 4th-magnitude, λ Libræ, a little west of β Scorpii.

NEPTUNE is in Taurus, almost on a line drawn from 4th-magnitude ι to 3rd-magnitude ζ Tauri, about one-fourth of the distance from ι.

METEORS may be looked for on March 1st, 2nd and 4th.

THE great sunspot of January last, presenting an apparent diameter of about 85″, must have really had a length of something very like 74,000 miles.

VARIABLE STARS in good position during March are:—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| R Hydræ ......... | 12.22 | 22° 36′ S. | 4·0 | 11·0 | 448·0 days. |
| T Ursæ Majoris | 12.30 | 60° 12′ N. | 6·5 | <13·0 | 256·0 days. |
| R Virginis......... | 12.31 | 7° 42′ N. | 6·5 | 10·7 | 145·8 days. |
| α Ursæ Majoris | 10.56 | 62° 24′ N. | 1·5* | | 33 days. |

* The variation is in colour from yellowish-white to red. The mean period given is according to Weber.

Attention should also be given to the principal stars in Corvus, a compact constellation south of Virgo. Ordinarily the brightest star of a constellation is marked α. The present order of brightness is usually γ, δ, β, ε, η, α, but variations are frequently used.

THE ROTATION OF VENUS.—At this time, whilst the planet is so well placed for observation, it is interesting to read the following extract from a communication on "The Work of the Manora Observatory in 1896," contributed to "The English Mechanic" by its director. "Venus was observed seventeen times (14¼ hours) and a dozen drawings made, which confirmed her quick rotation." This is in confirmation of our own observations in February, 1881, when sensible movements of spots were observed from east to west, such as quite disposed of the idea that the planet revolved on its axis in 225 days, as some observers have supposed. Herr Leo Brenner has a good instrument, keen eye and fine situation for his work.

MINOR PLANETS.—During the year 1896 it is believed that no less than twenty of these little bodies were discovered, including three on December 31st, found by M. Charlois, of Nice. The total number known is 429.

"THE ASTRONOMICAL JOURNAL," so long and ably conducted by the late Dr. Gould, will in future be edited by Dr. S. C. Chandler, aided by Professors Asaph Hall and Lewis Boss.

MR. THOMAS GWYN ELGER, the director of the Lunar Section of the British Astronomical Association, has, we regret to say, passed away at the age of fifty-nine years. He has been a Fellow of the Royal Astronomical Society since 1871, and has long been known as a busy worker. In 1895 Messrs. Geo. Philip and Son published his work, "The Moon: a full description, and map of its principal physical features," perhaps about the best that the selenographical student can have. The map is to the scale of eighteen inches to the moon's diameter. He is one who will be missed.

DR. G. D. E. WEYER, Professor of Mathematics and Astronomy to the University of Kiel, has also died.

METEOR OF NOVEMBER 29TH.—I was out on the night of November 29th last, and saw the brilliant meteor. The time was a few minutes after 9 o'clock. It seemed to me to be about the size of a cricket-ball when I first saw it. It appeared to break into three parts, two following in succession behind the first, and the colour was a brilliant steely blue. It was travelling in a westerly direction, and appeared to be at an angle of 70° with the horizon. It was mentioned in one of our local papers as having been seen by three correspondents: one at Sandgate, one at Putney and one at Hampstead. One of them compared it to a rocket, and another to a ball of lurid fire. I did not see its actual disappearance, as it was hid from my view by a building.—*Thomas Edwards, Cliftonville House, Equity Road, Narborough Road, Leicester; January 29th*, 1897.

# Notes & Queries

Parasite of the Tortoise.—Referring to Mr. S. Howarth's remarks respecting the parasite of the tortoise, on page 236 of your February number, this parasite is not at all uncommon, and can frequently be found if looked for. On the tortoises which are exhibited for sale in the streets of this town, at certain times of the year, I have occasionally seen them, generally around the upper part of the legs, or in the hollows between the neck and the fore-limbs. From these places it is utterly impossible for the tortoise to remove its unwelcome guests. In Naples, Genoa and other Mediterranean ports the parasites can be found on the animals in far greater numbers than in this country, that is, so far as I have noticed. At the places named they are generally exhibited in old orange-boxes, each compartment containing animals of a similar size, and the price is usually 60, 70 and 80 centissimo (3d., 4d., and 5d.). Occasionally extra fine specimens, which are generally placed on the top of the box, and not packed one upon another inside, as the smaller ones are, fetch as much as 6d. or 8d. The wretched animals seem to be at times half covered with parasites, which resemble small brown specks. These frequently affix themselves on the tortoise just at the junction of the skin and the "shell." On several animals which I purchased I noticed the parasites, and, on asking the vendor, was informed that they were "young tortoise!"—*T. Sheppard, Hon. Sec. Hull Scientific and Field Naturalists' Club.*

Fossil Fern at Giants' Causeway.—With regard to the fossil fern mentioned by Mr. Barbour (*ante* p. 194) as having been found by him at the Giants' Causeway, no one seems to have hit on what to me seems to be the true explanation, viz., that it is not a fern at all, but a natural imitation of a fern. In fact it is probably nothing more nor less than dendritic crystalline markings on the rock. I have specimens of syenite (limestone from Lower Lias), flint and fine-grained altered sandstone, all having dendritic markings on their surfaces; some resembling ferns. In the Mineral Gallery at South Kensington Museum there is a specimen of rock with dendritic markings about four feet long, like the long fronds of a fern. I am speaking from memory as regards the size of the specimens. Here in Leicestershire at the syenite (granite) quarries the quarrymen often find such markings on the surface of the rock. The basalt at the Giants' Causeway would preclude all idea of it being a fossil fern. At the South Kensington Museum the composition of the dendritic marking is given as oxides of manganese. On page 172 of Geikie's Text-book of Geology, third edition, the chemical composition of ordinary basalt is given, and one of the constituents is mentioned as oxides of iron and manganese, so that in the rock itself is the material ready for forming the dendritic markings in any of the natural cracks or joints. If Mr. Barbour could obtain a piece of the marking it could be decided. It will be remembered that instances of these dendritic patterns on flints were figured in the new series of Science-Gossip, vol. i., pp. 267–8–9, illustrating an article upon them by Mr. Carrington.—*Thomas Edwards, Cliftonville House, Leicester; January 29th, 1897.*

Inebriety among Bees.—The "Journal of Botany" for last December contains a note by J. D. Williams on the intoxicating effects on bees of certain members of Compositæ and Dipsacacæ. Reading this recalled an observation of my own when staying in Torquay during the autumn of 1895. The beautiful lime-tree avenues there were a veritable death-trap to many thousands of bees, who sipped "not wisely but too well" at the bountiful supply of nectar provided, and then fell down inebriate to the road beneath, where they wandered about in a maudlin kind of fashion, a melancholy sight for any bee with a tendency to temperance work. The major part of the abandoned were too gloriously drunk to care what became of them, and simply lay supinely to be crushed out of recognition by the constant traffic, both vehicular and pedestrian. For several weeks the road beneath the lime-trees was literally carpeted with bees in various stages of intoxication, and the death-roll must have been enormous as the avenue was an important connection between Tor and Torquay, and much of the traffic from Torquay Station to the town passed along it. The bees that were fortunate enough to fall on the borders of grass growing along the side-paths appeared to gradually recover from the toxic effects of the lime-flowers, but whether it was to renew the debauch, or that the one experience enabled them to avoid any future excesses I am unable to say.—*George T. Harris, 33, Lindore Road, New Wandsworth.*

Nomenclature.—I cordially agree with a late correspondent in his remarks as to the uselessness if not actual mischievousness of altering old and well-known generic names; nor can I see that science gains any benefit therefrom or is in any way advanced by the change. As a worker in the Upper Tertiary deposits, and knowing the shells fairly well, I confess I cannot follow much of the new literature. *Helix ericetorum* every conchologist knows; but how many *H. itala* (Conchol. Soc. list)? Zonites is a useful name. Will the species be better understood if it is called *Hyalinia, Vitrea,* or *Helicella?* *Azeca* and *Zua* are well known, and I am glad to see them back again in the list referred to above, after they were turned into *Cochlicopa* by Jeffrey. Are we better off because our old friend *Paludina* becomes *Viviparus,* or *Cyclostoma Pomatias;* and then *Hartmanni* or *Cylichna, Utriculus* and other well-defined and well-known groups jammed into one as *Bullinella,* or, again, *Cyprina,* which the veriest tyro could not mistake if transformed into *Arctica?* Again, the passion for changing names because a genus in quite another class bears a similar one, or but slightly varied, is bound to lead to confusion. I write as much the interest of the newer generation, to whom the older works of Lyell, Woodward, Wood, Beck, and others are becoming practically obsolete, as my own. *Cheamys* may be a very pretty name, and probably a very old one, but surely *Pecten* is quite as good, and far better known to all collectors and students. The reason, I am told, why these changes should be made is to bring us into line with continental writers. That is all right; but it seems to me that there are as good men in the United Kingdom as there are on the Continent, and quite as well worth following. As regards "honouring" the authors by restoring their

often obscure or forgotten names, the work will never stop if it is going on at its present rate; a little injustice of this kind may be easily passed over. I see our British Helices are now divided into fourteen or fifteen sub-genera. Cannot some enthusiast for this sort of thing make a few more?—*Alfred Bell, London.*

Parasite of Tortoise.—I can supplement to a small extent Mr. Howarth's very interesting note in last month's Science-Gossip (*ante* p. 236) respecting his discovery. A tortoise was bought from a man in the street in the spring of 1895; it was placed in the garden, and soon afterwards I discovered on it, in various places, a number of the parasites. There were four in good condition and the incomplete remains of several others. On attempting to remove them they were found to be so firmly attached that it was impossible without risk of damage. The tortoise did not appear inconvenienced when even strong traction was made, except in the case of one, which was fixed in the somewhat thinner skin lying between the front legs and neck. When this one was touched the tortoise withdrew itself sharply, as though pained. I believe from general appearances that this was the only living specimen. Both paraffin and sweet oil were applied in hopes of killing the creatures, if not already dead, and obtaining them without injury, but they held on just the same after the application. Finally one was removed by main force, plus a piece of the host's skin, another came off entire, with the mouth organs complete, the other two left them imbedded, but one set was extracted without injury afterwards. On examination under the microscope, my specimens agree so closely with Mr. Howarth's drawings that there can be no doubt as to the identity of the species, although none of them have been so fortunate as to show the lancets extruded. The antennæ exactly correspond, and the curious tufts of hairs at the apex, shown at fig. *b*, are especially noteworthy. Eyes are absent. In all my specimens the two halves of the double proboscis, however, lie closely together, and on the under side there is a structure not in the drawings. It is a kind of case, or partial sheath, very like the under half of a duck's bill in shape, somewhat concave on the upper side, and in this hollow the pair of tubes lie, partly enclosed and protected by it, and it extends a little beyond their ends. At the tip, and for about one-half of the length behind it, there is a number of triangular tooth-like projections pointing backwards, and it is these projections which give the owner such a secure hold on the skin of its unwilling host. It is easy, on looking at them, to understand how, even in death, the attachment would still be maintained, and that nothing probably but destructive force would effect removal. A similar structure does not exist on the upper side, unless, indeed, in all my specimens it has become detached and lost, as was evidently the case with the lower side in the one from which the drawings were made; but there is no evidence of rupture visible in mine. From its position and structure it may be concluded that this sheath is the weapon which first punctures the tough skin of the tortoise and enables the somewhat delicate tubes with their enclosed lancets to enter without injury. The legs appear to be weak and inefficient, the tarsi especially so, and probably the animal—particularly the female—having once obtained a suitable position on the host seldom or never quits it. In fig. *d* a kind of pad may be seen under the terminal claws, which is, I think, referred to in the appended family description and would be useful in crawling over the slippery, hard skin, where claws alone might fail. There is but very scanty notice of this parasite in any books accessible to me. In the Rev. J. G. Wood's "Natural History," 1863 edition, page 683, the following occurs: "There is hardly any animal which is not subject to the attacks of these tiresome mites, and even the hard-shelled tortoise itself is not free from them. They fix themselves so firmly with their barbed grapnels that if they are roughly torn from their hold they either leave their heads in the wound or carry away part of the flesh." In the table of generic distinctions, page 801, the family Ixodidæ is described: "Body with leathery covering; beak blunt, toothed at tip, barbed at middle; last joint of feet two-clawed, with vesicle." Genus *Ixodes* described same as family; no doubt our specimens belong here. In Carpenter's "Microscope and its Revelations," seventh edition, there is a good deal of information about the family scattered through page 932 and several following.—*Jas. Burton*, 9, *Agamemnon Road, West Hampstead.*

Charles Darwin and Heredity.—Professor Poulton, of Oxford, in a recent work on Charles Darwin, remarks as follows: "Darwin's power was largely due to the inheritance of the imagination of his grandfather, combined with the acute observation of his father. Although he possessed an even larger share of both these qualities than his predecessors, it is probable that he owed more to their co-operation than to the high degree of their development." Now, some people who carefully consider this passage will not agree with the learned Oxford Professor. Powers of imagination and of acute observation do not co-exist in the scientific intelligence, and the late Charles Darwin was not very strong in the latter attribute. The grand secret of his success was his singular power of literary imagination, which the force of circumstances, habits, character, etc., directed into a particular field of thought. His grandfather had fought very valiantly in the endeavour to manufacture poetry out of bald and dry scientific material. The illustrious grandson attempted precisely the same feat; but his plans and course of procedure were decidedly more astute and more carefully prepared. Modern scientific investigators commence work by analysing the concrete so as to arrive at a general fact or law. In doing so they develop any amount of experimental subtlety; but if anything apparently anomalous or exceptional is encountered they lay it aside and await further information about it. Not so Darwin. He failed to find the facts by analysis, but he eagerly grasped the exceptions, however trifling or insignificant, and it was these that set his imagination agoing. For instance, he noticed in the course of experiments directed to another object that the offspring of a cross were superior in vigour to seedlings of self-fertilized parentage; and it has been said that the whole of the important researches into the effects of cross- and self-fertilization originated in this accidental observation. As a matter of fact, as is now well-known, this superiority in vigour is merely exceptional, and self-fertilizers are immensely more productive than those dependent on insect aid. However, the observation was eagerly seized as an appropriate pabulum for Darwin's inimitable theorizing faculties.—*Dr. P. Q. Keegan, Patterdale, Westmoreland; January*, 1897.

## BOTANY

Variations of the Leaf-Blade.—This subject is extremely important in many respects; but for that very reason we must be all the more careful and cautious in assigning true causes to the effects that we see produced in nature. For instance, I cannot agree with the conclusion (*ante* p. 210) that warmth and moisture favour the growth of the parenchymatous and vascular tissues of land plants. It is indeed the first time that I ever read that midsummer was characterised by warmth and moisture. The principal factor in the production of leaf variation is an intense illumination which, all other conditions being alike, evokes the following differences in structure, viz.: the palisade parenchyma exhibits a greater development; the leaf is thicker, has a greater abundance of chlorophyll, the different elements of the epidermis are more developed, the cuticle in particular is much thicker, the stomata are more numerous, especially on the upper surface. Light, however, is not the sole cause, it is aided purely and simply by dryness of the air, and this produces precisely similar effects, although in a much less marked degree. The third and last agency in the work is that of temperature, and this, when warm, aids the two foregoing causes, but when cold it helps to develop the protective tissues and at the same time diminishes the number and size of the vessels, and also the tissues whose function it is to nourish the plant. These facts taken together and wrought out on the basis of the Lamarckian philosophy will be found to harmonise exceedingly well with the physiological needs of the plant under the physical conditions specified above. To come to details, the cases of the leaves of the fig-tree figured at page 210 (*ante*) must now be considered. In this instance the leaves do not "become larger as the *warm* weather advances"; it is not the warmth and dampness of midsummer that favours the rapid lengthening of the midrib; both effects are really due to the increased illumination and dryness incident to that season. The rapid lengthening of the midrib is not a cause, it is an effect due to the same causes that produce a broader or narrower and thicker leaf. Mr. Griset's explanation of the sub-division of the leaves of the bittersweet and of aquatic plants is correct, except that want of light is only a circumstance and not an active agent. The round entire form of many floating leaves are not floats to buoy the plant to the surface of the water. It is the inner or organic needs of the plant under the conditions of its environment which prompts the "highly accommodating protoplasm" to adapt itself to circumstances, and thuswise there is formed on the surface of the water a broadly and beautifully rotund area of leaf structure which, although fully and freely exposed to light and air, does not need any contraction of its contour or any extra thickening of its tissues (as in land plants) in order to preserve it from the deadly effects of a too excessive transpiration.—[*Dr.*] *P. Q. Keegan, London; February 4th*, 1897.

## ZOOLOGY

Nesting-place of the Wedged-tailed Gull.—In "Science," January 29th, there is an interesting article on the discovery, by Dr. Nansen, of the breeding-grounds of Ross' gull, also known as the wedge-tailed or rosy gull, *Rhodostethia rosea*. In a letter published in the "Daily Chronicle," Dr. Nansen states that he found flocks of rosy gulls on August 6th, in latitude 81° 38′, east longitude 63°. The birds were seen near four small islands, called "Hirtenland" by Nansen, a little north-east of Franz-Josef Land. Though Nansen did not actually find nests he found the birds abundant, and concluded that their nests were probably near by.

Pallas' Willow Warbler in Norfolk.—Mr. Thomas Southwell, in the "Zoologist," gives a detailed account of the finding of a specimen of this rare warbler, *Phylloscopus proregulus*, at Cley-next-the-sea, Norfolk. Mr. Ramm, the person who shot the bird, says that he found it amongst the long grass on the bank or sea-wall not far from the sea at Cley, a locality which has produced many rare migrants. Apparently the last appearance of Pallas' willow warbler in Europe was that mentioned by Herr Gätke, in his "Birds of Heligoland," p. 293. It was found by Claus Aeuckeus, one of his collectors. Mr. Seebohm, in the "Catalogue of Birds in the British Museum" (vol. v., p. 72), states that this bird breeds in the sub-Alpine districts of South-Eastern Siberia, and throughout the Alpine districts of the Himalayas from Cashmere to Burma, passes through North China on migration, and winters in South China, Burma and Bengal, and, it may be added, occasionally strays as far west as Heligoland and the east coast of Britain.

The Zoological Society has just acquired a female monkey of the genus *Cercopithecus*, which is of very great interest, inasmuch as no specimen of this particular species has been received at the menagerie since 1841. Dr. Sclater put this species (*C. tantalus*) among those which he had not seen when he made his list of the known species of this large genus. In 1841 Mr. W. Ogilby called the attention of the members of the Society to a new species of monkey then in the Gardens, to which he gave the specific name *tantalus*. He referred to the group now called "green monkeys," and compared it with some of the members of that group. No details were obtainable as to the previous origin of that specimen. The question as to its native land, however, is now definitely settled, for the new arrival is known to have come from West Africa. She presents many points of resemblance to the Grivet (*C. griseo-viridis*), from East Africa and Abyssinia; to the ordinary green monkey (*C. callitrichus*), from West Africa; and to the vervet (*C. lalandi*), from South Africa; yet the points of difference are sufficiently well marked to show that she can be classed with none of the three.

# TRANSACTIONS

City of London Entomological and Natural History Society.—Tuesday, January 19th, 1897. Exhibits: Mr. E. Heasler, a series of *Aplecta prasina* taken at sugar in June last at Brockenhurst; series of *Hylophila bicolorana*, bred from larvæ taken at Loughton, and *H. prasinana*, captured at sugar in New Forest. Mr. J. A. Clark, a dark specimen of *Acherontia atropos*, the larva being taken at Walthamstow in August, and imago emerging November 25th; also picked variable forms of *Angerona prunaria*, var. *sordiata*, six male, four female, bred from ova laid by a female the last of three impregnated by same male. The brood consisted of eighty-two larvæ, of which about sixty-five successfully passed through all stages. Amongst the males variation occurred in the size of the orange marking in apical angle of fore-wings, which marking coalesced with the central orange area in one specimen; in another the orange area was streaked with black lines. A female was asymmetrically marked, the left hind-wing being without the broad dark border of the right. Also *Aglais* (*Vanessa*) *urticæ*, caught in August last at Ponder's End, with the black spots at costal margin much suffused, and the two outer confluent. Also two vars. of *Pieris rapæ* from same locality, the upper wings of one, a male, being almost perfectly white, with no darkening at tip of fore-wings, and the black spot in the middle showing dimly; the second, a female, having the hinder of the two spots on upper wing in duplicate. Mr. G. R. Garland, larvæ of *Trochilium crabroniformis* (*bembeciformis*), from Manchester, feeding on wood of willow; also a series of *Nyssia zonaria*, taken at Blundellsands, near Liverpool; and a sample of cotton made by a new patent process to imitate silk. Mr. D. C. Bate, five well-marked male and one female *Dasychira pudibunda*, bred from larvæ *with black hairs*; all emerged in November, having been kept indoors. Also *Pœcilocampa populi*, the larva being beaten at Dorking. In endeavouring to breed *Hybernia defoliaria* he said his imagines emerged dwarfs, three being exhibited. The larvæ were obtained at Dulwich, and wild moths shown from same locality were of normal size. Mr. Clark suggested the dwarfing was perhaps caused by keeping the larvæ too dry. Mr. L. J. Tremayne read a paper entitled, "The History of Silk," and a vote of thanks was heartily accorded him.—*Hon. Secs., L. J. Tremayne, H. A. Sauzé.*

The South London Entomological and Natural History Society.—January 28th. Mr. R. South, F.E.S., President, in the chair. This was the Annual Meeting and devoted to receiving the report of the Council, the reading of the balance sheet and the address of the retiring President. The officers and Council elected for the ensuing year were:—President, R. Adkin, F.E.S.; Vice-Presidents, R. South, F.E.S., and J. W. Tutt, F.E.S.; Hon. Treasurer, T. W. Hall, F.E.S.; Hon. Librarian, H. A. Sauzé; Hon. Curator, W. West (Greenwich); Hon. Secretaries, Stanley Edwards, F.L.S., F.E.S., and H. J. Turner, F.E.S.; Council, Messrs. C. G. Barrett, F.E.S., A. W. Dennis, H. S. Fremlin, F.E.S., W. Mansbridge, F.E.S., A. W. Mera, Hy. Tunaley, F.E.S., and Col. C. E. Partridge. Mr. South then delivered his address. After referring to the good position which the Society still continued to maintain in membership and usefulness as well as in its finances, he pointed out various lines of study which members of the Society might with benefit take up. Especial interest was attached to the study of the various means of protection in insects. He spoke of the extraordinary interest shown in natural history by the general public, as evinced by the success of so many recent publications. After enumerating the new additions to the British fauna, he remarked on the growing interest taken by British entomologists in European lepidoptera, and said that no doubt the result would be the degradation of many now called species. In reference to the study of variation he considered that much more attention might be paid to the distribution of varieties. He stated that classification seemed to be in a state of chaos, each of the several works recently issued on lepidoptera differed very materially in that respect. He referred in glowing terms to the recent experiments of Weismann, and urged all those who took an interest in breeding to work much more on experimental lines.—February 11th, Mr. R. Adkin, F.E.S., President, in the chair. Mr. Barrett exhibited specimens of a species new to Britain, *Platyptilia tessaradactylus*, taken by Mr. de V. Kane in the west of Ireland; the specimens were greyer than the usual German form. Mr. Routledge, a fine var. of *Dianthæcia conspersa*, bred from Orkney; it was generally ochreous, the usually white markings being grey. Mr. Tutt, dead larvæ of *Hepialus lupulinus*, which had been attacked by a fungus. Living larvæ were also shown which had nibbled the dead ones. On behalf of Mr. Fletcher, of Worthing, he exhibited a series of hybrid Zygænidæ, from continental *Z. ochsenheimeri* and British *Z. filipendulæ*, which hybrid race was perfectly fertile; also, on behalf of Mr. Prince, of Cheshire, a large box of common species, showing the local forms and range of variation; among these the *Nyssia zonaria* was most interesting for the variation in the transverse lines; and, on behalf of Dr. Chapman, the living larva of *Bryophila perla*, showing its silken gallery to which it retires during the day; it was noted that the species did not hibernate, but fed all the winter. Mr. McArthur, a specimen of *Aplecta occulta* just bred from a Rannoch larva. Mr. Adkin, a series of the same species, part taken and part bred from larvæ taken at the same locality. They were of good size and very darkly marked. Mr. Perks, specimens of the "Jumping Bean," a Mexican fruit containing the larvæ of *Carpocapsa saltitans*. The remainder of the evening was devoted to the exhibition, by means of the lantern, of some sixty photo-micrographic slides of insect anatomy by Mr. F. Clark, aided by Mr. Furneaux, F.R.G.S. Some of the prepared objects from which slides had been made were kindly lent by Mr. W. West, of Streatham. Mr. Clark first showed, by means of diagrams, his method of making the slides, and then went on to exhibit various forms of antennæ, the trachæ, several forms of the tongue, the compound eye, scales of lepidoptera, hairs of common larvæ and a most interesting series of the parasites of man and animals. The large screen used had been bought by Mr. Edwards and most kindly presented to the Society, which is now admirably equipped

with its lantern and all appliances for demonstration purposes.—*Hy. J. Turner, Hon. Report Secretary.*

THE NORTH LONDON NATURAL HISTORY SOCIETY'S fifth annual exhibition was held in the lecture hall at the North-east London Institute on Saturday, January 2nd, 1897. The exhibits were, if anything, even more numerous than last year, and a great improvement was made in covering the walls with photographs and botanical specimens. The entomological department was, as usual, the best represented, but botany was also very much to the fore, and a charming little table was made up of ornithological exhibits supplied by Mr. Barber. Mr. Hanbury's botanical stand was as attractive as ever. Lantern illustrations were once more on view, Mr. Wattson contributing some more "life in a pond," and Dr. Gerard Smith attracting great attention with his photo-micrographs illustrative of plant morphology, marine zoology, etc. Short lectures were delivered during the evening—by Mr. Bacot, "On behalf of Insects; by Mr. R. W. Robbins, on "Botany"; by Mr. Wattson, on "Pond life," and by Mr. Rose, on "The flight of birds; and were well received. The exhibition was unanimously admitted to be the best the society have yet held.—*Lawrence J. Tremayne, Hon. Sec.*

CAMBRIDGE ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—January 29th, the President, Dr. Sharp, in the chair. Mr. Doggett exhibited a pair of grasshopper warblers with nest and eggs, from Wicken Fen; a pigeon with webbed feet; six eggs of the barn-owl, taken from the nest at the same time, dissected to show the embryos therein, which varied from three to thirteen days in age. He said there was also a young bird just hatched in the nest with the eggs. Mr. Farren showed a wax-wing lately shot in the Orkney Islands; also two young specimens of the great northern diver from the same locality, one in an interesting stage of plumage, the grey feathers of the young bird just changing to the black and white of the winter plumage. The President made some remarks upon insect mechanism, illustrated by a South American form of the common "click beetle." Mr. Rickard read a paper upon the same subject, discussing the way in which the movements of the well-known jumping beans are brought about by the larvæ inhabiting them.—January 15th, Dr. Sharp in the chair. Mr. Rickard showed some tadpoles of the common frog in a lively state; these had remained over from March of last year, though others under the same conditions had become frogs. Mr. Doggett exhibited a series showing the development of the common trout (*Salmo fario*) from the egg to the adult fish; also a chevril, a variety of the goldfinch, from Midsummer Common. Mr. Fleet exhibited a good specimen of a large weevil (*Cleonus nebulosus*) from the crop of a stone-curlew purchased in the market. It was suggested that a probable locality for both bird and beetle was Brandon. Dr. Sharp exhibited a fine mass of the cocoons of *Aphomia sociella* picked up in the neighbourhood; also some remarkable dipterous larvæ, viz., an undescribed Tabania larvæ from the New Forest, with feet disposed all over the body and somewhat allied to *Tabanus spodopterus*: he thought it might be the larva of *Atylotus;* larva of *Scenopinus fenestralis* from Bucks. He called attention to the importance of ascertaining whether this larva is injurious, as commonly supposed, or whether it is present in woollen goods only to destroy other larvæ such as those of the clothes moth; larva of Microdon found in Portugal by Colonel Yerverry, which shows no sign of segmentation; also *Idolothrips spectrum*, sent by Mr. Froggatt from New South Wales.—February 12th, Dr. Sharp, the President, in the chair. The President showed a remarkable stridulating apparatus in a larva of the coleopterous genus *Passalus*, recently sent by Mr. C. Hose from Borneo. He said that these larvæ are very abundant in logs in the tropics, and it was difficult to imagine what use such an elaborate organ could be to them. Mr. Farren exhibited two black guillemots from Orkney, one killed on January 18th, and the other on February 6th. The former was in full winter, the latter in full summer, plumage. Mr. Rickard showed a collection of corals and polypes from South Africa. Mr. Doggett has a preparation showing the development of the common grass snake from the egg. He also read a paper upon Apteryx. He said that during the last ten years he had kept in captivity five of the six described species of this genus. Upon one occasion a bird in his possession had laid an egg. He described its habits in captivity, dealt with many of its peculiarities in structure, and mentioned some of the Maori legends in connection with this remarkable bird. The paper was illustrated by a skin of *Apteryx naasti*, and a skeleton and egg also of the genus *Apteryx*.

NORFOLK AND NORWICH NATURALISTS' SOCIETY.—A meeting of the Norfolk and Norwich Naturalists' Society was held at the Castle Museum, January 26th, the President, Sir F. G. M. Boileau, Bart., in the chair. Mr. Southwell read a paper on the recent discoveries with regard to the reproduction of the eel. Referring to his previous communications he said that very little advance had been made in our knowledge of the subject since his last address, but that in November last a communication was read before the Royal Society, embodying the results of the observations of an Italian naturalist, Professor Grassi, in which it was shown that a remarkable little fish found by him in the Strait of Mesina was the larval form of the common eel. This singular little creature was known as *Leptocephalus brevirostris*. Dr. Grassi traced this little creature through all its metamorphoses to the "elvers" which ascend the rivers in the spring. The result of these observations was to fill up the gap in the knowledge of the life-history of this common fish, which, much to the discredit of naturalists, existed between its migration to the sea and the return of the new generation of elvers in the spring. Many other doubtful or obscure points were also cleared up, and the general result is that we are justified in concluding that all the strange variations so noticeable in this fish, some of which are even regarded as distinct species, are but stages in its final development, which does not take place until its arrival in the deep sea, where it performs its appointed function of reproduction. Mr. G. H. Harris read "Notes on Yarmouth Herring Fishing of 1896." The herring fishing of 1896, he said, was notable for two characteristics—a large catch and low prices, the result being unsatisfactory to the boat-owners. Exception must be taken, however, in the case of the Scotch boats. As a whole theirs was a satisfactory fishing. This was due, indirectly, to the competition set up by the Norway herring. Exported from Norway to England, these fish depreciated prices on the home markets; exported also from Norway to the Continent, they demoralized the continental markets. The reason

of the demoralization lay not only in the fall of prices, but also in the fact that being large and, at the same time, coarse fish, they set up a prejudice in these markets against all large fish. Herring caught in Yarmouth boats were large fish, and not being easily distinguished from the Norwegian article by the inexperienced eye, fell under the same condemnation. But the Scotch caught a smaller fish by reason of the smaller mesh of the net they use. These fish, by reason of their smaller size, found favour as "pickles" in the Continental markets, to the detriment of the Yarmouth-caught herring. Another cause militating to the disadvantage of the Yarmouth catcher as against the Scotch catcher lay in the fact that Yarmouth boats salted their fish, whilst Scotch boats made short voyages and landed none but fresh fish. The salt item was always considerable, and when "gluts" came and prices fell indefinitely, serious. But the avoidance of the expense was practically impossible, owing to the insuperable difficulty of dealing with unlimited quantities of fresh fish. In 1896 the total catch landed at Yarmouth was 19,250 lasts. Of this number 14,420 were caught by Yarmouth and Lowestoft boats, and 4,830 by Scotch boats. 145 Yarmouth boats were engaged, catching perhaps 85 lasts per boat; 129 Scotch boats were engaged, catching about 37 lasts per boat. The total catch landed at Lowestoft throughout the year was 8,189 lasts. Of these, the spring and summer voyages accounted for 687 lasts. In Yarmouth, the spring and summer voyages were so unimportant as to be almost neligeable, yielding only 260 lasts. The discrepancy that a calculation made to afford a comparison between the respective average catches of Yarmouth and Lowestoft boats, and based as the above figures disclosed, was due to the large number of Lowestoft-caught herring landed at Yarmouth. The total number of herring landed at Yarmouth may be set down at 254,000,000. It was remarkable that this vast host should be "told," that is, literally counted, not in ones, but in fours or "warps." The fish were "told" into baskets or "mands" on deck. Thirty-three "warps" or a "long tale" (or long tell) hundred go to a "mand." The "mand" was slid on a plank from deck to quay, carried across the road, and emptied into a larger basket, or "swill." Thirty "swills" went to the "last." A "last" was 13,200 herring, or 3,300 "warps." Was the word "mand," now applied to the basket, originally the word for the heaps or "mounds" of fish, each numbering 132? Mr. W. H. Tuck sent a list of Aculeate Hymenoptera from Tostock, Suffolk, collected in 1896, which brings the list for that parish up to 181. Mr. A. W. Preston, F.R.Met.Soc., contributed the "Meterological Notes for 1896." The two most remarkable points to be noticed were the lowness of the rainfall, being three to four inches deficient, and the comparative absence of severe thunderstorms during the summer. Mr. J. H. Gurney, F.Z.S., exhibited a white variety of the Sanderling, from Heacham, and an owl new to science (*Scops albiventris*), from Lombok.

Hull Scientific and Field Naturalists' Club.—The usual fortnightly meeting of this club was held in the Friendly Societies' Hall, Hull, on Wednesday evening, January 20th. The President, Dr. J. Hollingworth, M.R.C.S., occupied the chair. There was a very good attendance. Mr. Boult reported that he had recently paid a visit to New Holland on an entomological expedition, but as the "willows" had been cut down, he made a fruitless journey. He stated that as a rule the willows were left growing until the end of February or early in March. Mr. Audas stated that the white-tailed eagle had recently been seen passing over Speeton Cliffs. Other interesting ornithological notes were also contributed by various members. It was also pointed out that seals had lately been observed at Scarboro' and Bridlington. The exhibits included a skull and several bones of a bronze-age Briton, recently found at Brough by Mr. T. Sheppard, and several entomological specimens by other members. Mr. Porter stated that he had received a letter from Mr. Russell, one of our former members, who is now in South Africa. Mr. Russell complains that it is almost an impossibility to keep entomological or indeed any natural-history specimens in that part of the world, owing to the ravages of the white ants. It appears these animals penetrate into every nook and corner, and their motto is "destruction." The preventives used in England have not the slightest effect upon the white ant. Mr. G. Ross read a paper on "Spiders." The first part of this was devoted to a description of the various organs of these animals, and their uses. With the aid of diagrams and black-board illustrations, the relative positions of the organs were most clearly shown, the brain, nervous system, eyes, mouth, "spinnerets," alimentary canal, limbs, etc., all receiving consideration. The second portion of the paper, dealing with the lecturer's personal observations of the habits of spiders, was well appreciated. Mr. Ross explained, in his characteristically humorous fashion, the various little antics he had watched, and the experiments he had conducted with these animals. A discussion followed, in which several members took part. Messrs. Boult and Porter then gave notes "On Recent Progress in Local Entomology." Mr. Boult, who is the club's curator, exhibited five cases of entomological specimens, which had been added to the Society's collection during 1896. In addition to the butterflies and moths, their caterpillars are in several instances also nicely mounted. Mr. Boult has long had a reputation for the excellent manner in which he preserves caterpillars, and those in the cases just referred to were up to the usual standard. In addition to the name which accompanies each specimen in the collection is a number, and Mr. Boult explained that opposite the corresponding number in the "record" book were full particulars of the specimen—where found and when, by whom, names of specimen (both common and scientific), by whom presented to the collection, etc. Mr. Porter referred to the finding of a specimen of that rare moth *Boletobia fuliginaria* on a lamp near the Alexandra Dock, Hull, during the past year. This moth, which is rare, has not previously been recorded for Yorkshire. The specimen has been identified by Mr. J. W. Tutt, of London. It was stated that as the specimen is slightly damaged it was desirable to have, if possible, further examples, and the members, especially the entomologists, were urged to carefully examine the land in the neighbourhood of the docks during the coming summer, in the hopes of securing further specimens. Mr. Porter also read an account of a find, in 1884, of the same species of moth on the banks of the Thames at Bermondsey. At the latter place, however, in addition to the moth, the larvæ were discovered feeding on a black fungus or mould which grew on old beams there.—Wednesday, February 3rd. The President,

Dr. J. Hollingworth, M.R.C.S., occupied the chair. Mr. Boult exhibited a series of specimens representing the life-history of the common vapourer (*Orgyia antiqua*), including the male and female, pupa, larva and eggs. The same gentleman also reported having received about 200 specimens of beetles and butterflies from Mr. Russell, who is in South Africa. A good selection of these were handed round for inspection. The gorgeous colours of the butterflies were admired by all; we have nothing like them in this country. A letter was read from Mr. Russell in which he described an adventure he had had with a baboon. It appears these animals make raids on the gardens, etc., in the vicinity of the towns, much to the annoyance of the inhabitants. Mr. Coverdale exhibited a specimen of the bramling or bramble finch (*Fringilla montifringilla*, Linn.) which he had recently shot at Sand-le-mere, near Withernsea. Mr. J. Stow also sent a specimen of the same bird to the club, which he had captured at Hessle. Mr. Audas explained that the brambling is a migrant, only visiting this country in the winter, its home being in Siberia. Mr. J. Coverdale was elected a member of the Society. Mr. J. R. Boyle, F.S.A. (Author of "Lost Towns of the Humber," "The History of Hedon," etc.), then proceeded to give a lecture on "The Site of the old River Hull." It was pointed out that formerly an arm of the present River Hull flowed along where Waterhouse Lane and Castle Street now are, the old "Lime Kiln Creek" being a portion of this stream. He also explained that the "old town" of Hull, that is the town within the docks, was built on an island formed between the two arms of the River Hull. Seeing that this island was formed and went on increasing in height as layer after layer of Humber warp accumulated on it long after the embankments on the Hull and Humber had been built, it was consequently of a higher level than those parts of the town situated outside the docks. Mr. Boyle then proceeded to show that the Beverley, Anlaby, Hessle and Holderness Roads were much lower than, say, Whitefriargate, Lowgate, High Street, and other parts of the old town. An excellent plan of Hull, on a large scale, was exhibited in illustration of the lecturer's remarks. A hearty vote of thanks was accorded Mr. Boyle for his valuable paper, the President complimenting the club on being the first public institution to hear the result of Mr. Boyle's recent investigations. —*T. Sheppard, Hon. Sec.*, 78, *Sherburn Street, Hull.*

## NOTICES OF SOCIETIES.

The South London Entomological and Natural History Society.
Mar. 11.—Discussion on "Insect Protection." Opened by C. G. Barrett, F.E.S.
„ 25.—"A Neglected Family." By Fred. Enock, F.L.S., F.E.S.
Apr. 8.—"On the Nature of Genera." By J. W. Tutt, F.E.S.
„ 22.—"Some British Spider-crabs." By E. Step, F.L.S.
Papers have also been promised by F. Merrifield, F.E.S., G. R. Grote and others.—*Hy. J. Turner, Hon. Report Sec.*

North London Natural History Society.—The following are amongst the fixtures for next session:
Mar. 27.—Visit to the Epping Forest Museum.
Apr. 8.—Discussion: "The Filices or Ferns." Opened by R. W. Robbins.
May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.
„ 15.—Whole-day Excursion to Brentwood.
„ 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
„ 10.—Debate: "Is Vivisection Justifiable?"
„ 19.—Half-day Excursion to the Lea Valley.
There will also be a special-family discussion entitled, "The Liparidæ," to be opened by A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

Lambeth Field Club and Scientific Society.—We have received the following list of fixtures for the forthcoming session:
Mar. 1.—"To Norway in Quest of a Shadow." A. C. D. Crommelin, F.R.A.S.
„ 13.—Visit to Natural History Museum.
„ 15.—Photographic Demonstration. H. W. Cosson.
April 5.—"Simple Types of Plant Life." E. J. Davies.
„ 10.—Visit to Zoological Gardens.
„ 19.—Easter Monday.—Outing to Effingham.
May 3.—"Some of our Smaller Song-birds." E. W. Harvey-Piper.
„ 8.—Outing to Sanderstead (with Selborne Society).
„ 22.—Visit to Kew Gardens.
June 7.—Whit-Monday.—Outing to Cheshunt.
„ 19.—Outing to Caterham. *H. Wilson, Hon. Sec.*, 14, *Melbourne Square, Brixton Road.*

Hull Scientific and Field Naturalists' Club.
Mar. 3.—Lecturettes: (1) "Migration of Birds." T. Audas, L.D.S. (2) "Extinct Animals of Holderness." T. Sheppard.
„ 17.—"Notes of a Tour in Switzerland," illustrated with lantern views and natural history specimens. F. W. Fierke, M.C.S.
„ 31.—"A Theory of Creation." Rev. C. S. Hall.

# NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s.* 6*d.* for twelve months (including postage), should be remitted to the Proprietors, 60, St. Martin's Lane, London, W.C.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

## EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Will exchange spread diatom slides for other objects, or books on microscopy.—H. Platt, Priory Villa, Victoria Road North, Southsea.

Duplicate sets great northern diver, Buffon's skua, Manx shearwater, Leach's petrel, osprey, killdeer plover, purple martin, sooty and noddy terns, curlew.—F. W. Paple, 62, Waterloo Street, Bolton.

Fossils and recent shells (some hundreds of species) offered in exchange for fossils from any formation, British or foreign; lists on application.—Rev. John Hawell, Ingleby Greenhow Vicarage, Middlesbrough.

Fossils, minerals, polished specimens, shells, micro sections and material, microscopic slides, and curios offered. What returns in exchange?—A. Sclater, Natural History Store, Teignmouth.

Wanted, Hinks' "Hydroid Zoophytes and Polyzoa" and other works, in exchange for Deakin's "Flora Brittanica," 4 vols., coloured plates; microscope, slides, etc.—J. Neeve, 4, Sydenham Road, Deal.

Polycestina barbadoes, cleaned diatoms, various. Wanted, Foraminifera, or shore sand containing same.—A Henley, 303, Strand.

Wanted, good microscope lamp with metal chimney, for cash.—A. Alletsee, Clifton, Milward Crescent, Hastings.

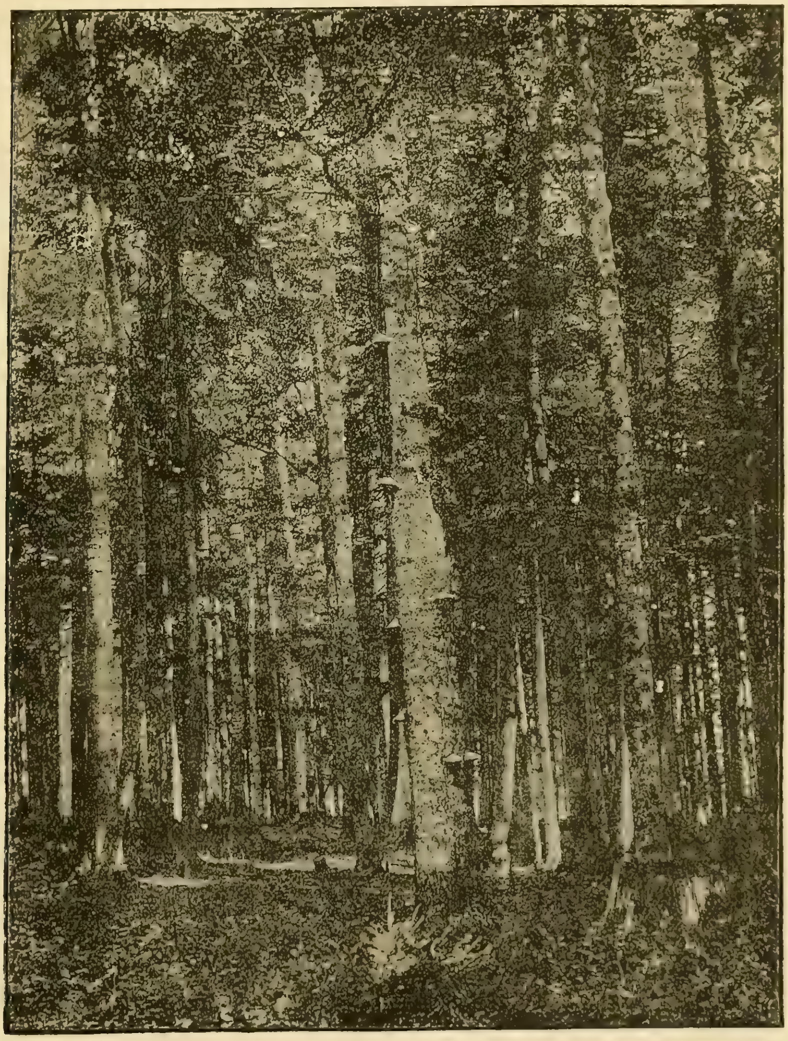
Wanted, offers for Science-Gossip from start, in 1865, 32 vols., 1 to 28 bound in publisher's cover, remainder unbound.—G. P. Bonny, 30, Wellington Road, Stoke Newington, London, N.

Offered, good recent foreign and some fossil shells; lists exchanged. Wanted, specially rare British marine, Helix revelata and Succinea oblonga.—Mrs. Carphin, M.C.S., 52, India Street, Edinburgh.

# FUNGOID PLANT DISEASES.

By John T. Carrington.

AMONG the inexorable laws of nature that govern the maintenance of the balance of life, disease is one of the principal factors in reducing the numbers of any especial species which is unduly asserting itself in increasing numbers. The most potent forms of disease, whether among plants or animals, are caused by fungoid or other cryptogamic parasites. To these sources may be traced the various epidemics which occasionally sweep large districts of the habitable world with apparently cruel severity. If, however, man could sufficiently understand their effect upon the future condition not only of the species attacked, but also of the surrounding inhabitants of the region affected, he might think less of the inconvenience to the individuals attacked, or of his own. Nature by its forces seldom exterminates the fittest inhabitants, except for the general good, and it is usually the weaker members of the species attacked that succumb. In maintaining the



Scene in a Bavarian Forest.
In the foreground a living beech-tree with seven sporophores of *Polyporus fomentarius*.
(*From "Diseases of Plants," published by Longmans & Co.*)

balance of life nature does not always resort to epidemic or sporadic efforts. There are always with us certain forms of what we term "disease," otherwise various parasitic life that exists at the cost of the hosts upon which it settles. In the vegetable world the most effective in keeping down a superabundance of any particular species are the diseases caused by attacks of cryptogamic parasites, especially of a fungoid nature.

These forms constitute the subject of one of the most valuable contributions to botanical literature which have been issued from the press for many years past. The author of this work is Dr. Karl Freiherr von Tubeuf, of the University of Munich, and his labours bear every evidence of the deliberate painstaking study which characterises scientific students of his nation.(1) The book grows on one as it is read and re-read, for its pages are rarely without one or more interesting fact with regard to some more or less familiar distortion or blemish in plant-life. The edition before us is, thanks to Dr. William G. Smith, of the Edinburgh University and the Royal Botanic Gardens of that city, rendered into English. Dr. Smith is no mere translator of this work, because he has long been known as an investigator in the field of research covered by organic disorders of vegetable life. Neither is the translator a stranger to the author, for, while working under his guidance, Dr. Smith saw the book take shape in his hands, and even added some items to its pages. In a subject so comparatively little worked as plant pathology, we may expect even the most perfect monograph soon to require amendment. This has been notably the case with Dr. von Tubeuf's, for the interest it created by its publication produced a number of new investigators, and consequently a large amount of new facts. Most of these, with the approval of the author, have been incorporated in Dr. Smith's production, which therefore becomes a new edition as well as a translation. We find that whole sections have been re-written, and the matter brought even with recent knowledge of their subjects. It is difficult to speak too highly of Dr. Smith's work, which shows a wide knowledge of fungoid diseases of plants and of the literature of the subject published in several languages in the eastern and western hemispheres.

WITCHES'-BROOM ON HORNBEAM.
*(From "Diseases of Plants.")*

The plan of Dr. von Tubeuf's "Diseases of Plants" is to take in review the biological, physiological and anatomical relationships accompanying phenomena of fungoid parasitism. There are also many remarks upon the preventive and combative agencies available against the more important diseases of economic plants. In writing the work the author has chiefly borne in mind that his duty first lay in educating and training his readers for systematic work in his especial field. For more exact descriptions he gives copious references to the works of specialists; Saccardo's splendid "Sylloge Fungorum," being one of the greatest. We do not wish to infer that without these works of reference the various species of fungi referred to by Dr. von Tubeuf would be difficult to identify, for such would be far from the truth. On looking through the pages there are few which will puzzle even the beginner, so plainly does our author deal with each. The works quoted upon fungi themselves, either from the view of scientific description or life-history, are all recent of publication and number over a dozen. Those on diseases of plants are also important and recent, numbering a couple of dozen titles.

The contents of this book are divided into two parts. The first contains nine chapters. They deal with the parasitic fungi, while the second part consists of four articles on classification and description of species. Parasitic fungi are described generally as the true fungi, together with the Myxomycetes, or slime-fungi, and the Schizomycetes, or bacteria, forming the group of cryptogams characterised by lack of chlorophyll or green colouring matter. These are broadly divided into saprophytes, being those which obtain nutriment

(1) "*Diseases of Plants induced by Cryptogamic Parasites:* Introduction to the Study of Pathogenic Fungi, Slime-Fungi, Bacteria and Algæ." By Dr. Karl Freiherr von Tubeuf. English edition by William G. Smith, B.Sc., Ph.D. 614 pp. large 8vo; 330 illustrations. (London, New York and Bombay: Longmans, Green and Co. 1897.) Price 18s.

from dead organic matter; and parasites which acquire their nutriment from living plants and animals. In his definition of the parasitism of fungi the author defines saprophytic fungi as "those which make no attempt to penetrate the tissues of living plants, but derive their nutriment from a dead substratum." On the other hand, parasitic fungi "are those which, stimulated by the cell contents of another living plant, penetrate wholly or partially into its tissues and draw their nutriment from that source." There are intermediate species of fungoid cryptogams which cannot be classed with either parasites or saprophytes. One section of these "attempt to effect an entrance into tissues of living plants by the secretion of some fluid or ferment, but only attain their object after first killing the part they attack." The other section are those "forms which inhabit wood of trees, but have not the power to penetrate through the outer tissues. They depend on first gaining entrance through wounds into dead parts of the bark or wood, and, after living there for a time as saprophytes, extend into the living elements, and cause their death." True saprophytes are those which regularly pass through their whole life-history in a saprophytic manner. This class of cryptogams are not treated in Dr. von Tubeuf's book before us, which deals chiefly with the true parasites that undergo no part of their development as saprophytes, but live in every stage of existence as parasites. There are also included the hemi-parasites and hemi-saprophytes. The former are capable, if need be, of becoming saprophytes for a season, but as a rule they live throughout their whole development as parasites. The latter usually pass through their lives as saprophytes, but occasionally are capable of existing wholly or partially as parasites. Some of these may be termed "occasional parasites," for under certain conditions they become parasitic.

EPICHLOE TYPHINA forming white circles on grass stems.
(*From "Diseases of Plants.*")

The "Uredineae, or rust-fungi, may be taken as the most typical of the true parasites. They constantly pass through their whole life-history on living plants, and cannot be cultivated on a dead substratum." The same may be said of the Erysipheae, or mildews, though their spores not infrequently reach perfection on a dead substratum, as do also those of *Rhytisma* and *Polystigma*. *Ergot* of grain and the *Sclerotinia* inhabiting berries are truly parasitic, though they may be in some stages saprophytically cultivated on dead organisms. These may be given as examples of true parasitism.

Chapter ii. of Dr. von Tubeuf's work is upon "Reaction of Host to Parasitic Attack," and will be found of highest value to the reader interested in malformations and abnormal growths among plants. In dealing with this subject the author reminds us that "The reaction of the host to the attacks of parasitic fungi is fairly constant for the same host and fungus. The various fungi, however, exert on the same host-plant each an influence of its own, while different host-plants behave very differently under attacks of the same fungus."

Among the more conspicuous of altered growths familiar to most of our readers are the "witches'-brooms," which are composed of many thickened twigs in bunches on various trees. These are the altered growths of the hosts caused by parasitic attacks of the fungoid group Exoasceae, of which the large genus *Exoascus* is typical. One section of the species of this genus attack the ovary or other part of the fruit, whilst the others attack the shoots or twigs.

We give, by permission of the publishers of the English edition of "Diseases of Plants," examples of some of the illustrations which are so excellent in this fine work. An effective one is fig. 265, a scene in the Bavarian Forest, near Bischoffsreut showing a living beech-tree with sporophores of *Polyporus fomentarius*. Another is

a group of grass infected with rings of *Epichloe typhina*, forming small white cushions on the stems so often to be seen on dry downs in England, and the "witches'-broom" on hornbeam (fig. 55), caused by *Exoascus carpini*.

There is an admirable double index to this book, the first part being of parasites and the second of host-plants, common names, etc. The whole work is well produced and forms a fine addition to the botanical literature which should be in every library of scientific works. By its aid and inspiration the study of plant diseases and the economic bearing upon the cultivation of food-stuffs or forest-trees will receive an impetus which, doubtless, in time, will lead to much saving of present loss to the general community.

## PLANTS AND MOSSES IN NORWAY.

By William Edward Nicholson.

(*Continued from page* 268.)

THE following mosses were gathered during the cruise referred to (*ante* p. 265) in the first part of these notes. The nomenclature follows in the main that adopted in "The Student's Handbook of British Mosses," recently published by Mr. H. N. Dixon and the Rev. H. G. Jameson, and, with regard to a few species which do not occur in Britain, that of the second edition of "Schimper's Synopsis." The letters "c. fr." mean that the specimens were found in fruit.

*Sphagnum papillosum*, Lindb.—Bogs near Odde and Molde. *S. rigidum*, var. *compactum*, Schp.—Common at Vadsö and Elvenes. *S. rigidum*, var. *squarrosum*, Russ.—Molde, c. fr. *S. acutifolium*.—Elvenes, c. fr. *S. girgensohnii*, Russ.—Horre Pass, near Odde. *S. lindbergi*, Schp.—Very wet bogs; Bodö, c. fr., Vadsö and Elvenes. This fine species varies considerably in colour, the Bodö specimens being quite pale, while those from Vadsö are dark purplish brown.

*Andreæa petrophila*, Ehrh.—Rocks, Bodö, Hammerfest and Elvenes, c. fr. *A. obovata*, Theden.—Rocks in a stream, Hammerfest.

*Tetraphis pellucida*, Hedw.—Rotten birch-stump, Elvenes, c. fr. The specimen is covered with abundant fruit.

*Oligotrichum incurvum*, Lindb.—Abundant on the Horre Pass, c. fr. Occurred also in a barren state at Vadsö.

*Polytrichum alpinum*, L.—Common in most places, c. fr. *P. urnigerum*, L.—Elvenes, c. fr. *P. strictum*.—Bogs, Harstad, c. fr. *P. formosum*, Hedw.—Near Odde, c. fr.

*Ditrichum tortile*, Schrad.—Horre Pass, c. fr.

*Swartzia montana*, Lindb. — Crevices in rocks, Vadsö, c. fr. *S. inclinata*, Ehrh.—Damp soil, Vadsö, c. fr.

*Sælania cæsia*, Lindb.—Sides of a cavity in a peat bog, Bodö, where the peat had been cut for fuel, c. fr. The bluish-green bloom of the leaves of this strange little moss at once distinguished it in the field.

*Cynodontium polycarpum*, Schp. — On a stump, Elvenes, c. fr. *C. virens*, Schp.—Rocks at Bodö and Vadsö, c. fr. *C. wahlenbergii*, R. and C.—Rocks on the Tyven, Hammerfest, c. fr.

*Dicranella cerviculata*, Schp.—Dry peaty places on rocks, Vadsö, c. fr. *D. secunda*, Lindb.—Common on damp soil by the roadside at Elvenes, c. fr. *D. squarrosa*, Schp. — Abundant by streams, Vadsö, Bodö, and in the more southern parts of Norway.

*Dicranoweisia crispula*, Lindb.—Rocks, Bodö and Vadso, c. fr.

*Dicranum falcatum*, Hedw.—Rocky ground, Horre Pass, c. fr. *D. starkei*, W. and M.—Bodö, c. fr. *D. bergeri*, Bland.—Marsh at Elvenes, c. fr. *D. fuscescens*, Turn. — Fir-stump, Molde, c. fr. *D. montanum*, Hedw.—Birch-stump, Elvenes *D. fragilifolium*, Lindb. — Common on rotten birch-stumps at Elvenes, c. fr.

*Fissidens bryoides*, Hedw.—Rocks facing the fiord, Vadsö, c. fr. *F. osmundoides*, Hedw.—Rocks, Vadsö. *F. decipiens*, De Not.—Wet rocks near Bergen.

*Grimmia apocarpa*, Hedw.—Abundant on rocks, Vadsö and Tromsö, c. fr. The var. *rivularis*, W. and M., occurred in a stream at Elvenes. *G. ovata*, Schwgr.—Rocks in the Nærodal, by Gudvangen, c. fr.

*Rhacomitrium aciculare*, Brid.—Common on stones in streams and wet rocks, Bergen, Molde and Bodö, c. fr. *R. protensum*, Braun.—Horre pass, c. fr. *R. fasciculare*, Schrad.—Rocks near the Lerfoss, Trondhjem, c. fr. *R. heterostichum*, Brid.—Stone wall, Tromsö. *R. sudeticum*, B. and S.—Rocks near Odde, c. fr. *R. lanuginosum*, Brid.—Abundant everywhere, the large grey cushions giving quite a character to the landscape in some valleys. In scrambling among rocks the danger of a fall may often be averted by alighting on one of these cushions.

*Hedwigia ciliata*, Ehrh.—Rocks, Bodö, c. fr.

*Desmatodon latifolius*, Schp.—Crevices of rocks near Vadsö, c. fr.

*Trichostomum tortuosum*, Dixon.—Abundant on walls in Tromsö and rocks near Trondhjem.—*T. fragile*, Dixon.—Peaty ground near Vadsö.

*Eucalypta vulgaris*, Hedw.—Stony ground, Bodö, c. fr.

*Ulota ludwigii*, Brid.—Tree trunks, Nærodal, c. fr. *U. drummondi*, Brid.—Common on tree-trunks at Molde and Trondhjem, c. fr. *U. bruchii*, Hornsch.—Trees near the Lerfoss, Trondhjem, c. fr. *U. phyllantha*, Bruch.—Trees by the shore of the fiord at Molde. *U. hutchinsiæ*, Hamm.—Rocks near Bergen, c. fr.

*Orthotrichum arcticum*, Schp.—Abundant on rocks on the island opposite Vadsö, c. fr. *O. leiocarpum*, B and S.—Trees, Molde, c. fr. *O. speciosum*, Nees.—Trees, especially in very damp and shady places; common near the Lerfoss, Trondhjem, c. fr. *O. tenellum*, Bruch.—Ash-trunks, Trondhjem, c. fr. *O. gymnostomum*, Bruch.—Aspen-trunk near the Böjum's Glacier, Mendall, c. fr.

*Splachnum sphœricum*, L.—Abundant in most of the bogs in the North, c. fr. The large tufts have often a very pretty appearance from the orange-coloured setæ, which were frequently very long. *S. vasculosum*, L.—Not uncommon with the last, c. fr.; a very large form occurred at Harstad.

*Tetraplodon mnioides*, B. and S.—Vadsö, Bodö and Hammerfest on decaying bones, c. fr.

*Tayloria lingulata*, Lindb.—Bogs to the west of Vadsö, c. fr.

*Meesia trichoides*, Spruce.—Common at Vadsö and Harstad, c. fr.

*Paludella squarrosa*, Brid.—This beautiful moss occurred in bogs at Bodö and Vadsö, fruiting rather sparingly in the latter place.

*Aulacomnion palustre*, Schwgr.—Common in bogs, with abundant gemmæ, and very variable; a form from Vadsö appears to agree with the var. *imbricatum*, B. and S.

*Conostomum boreale*, Swartz.—Drier parts of the peat bogs near Vadsö, c. fr.

*Bartramia ithyphylla*, Brid.—Crevices of rocks, Vadsö and Hammerfest, c. fr. *B. pomiformis*, Hedw. —A very tall form on rocks near Gudvangen, c. fr.

*Philonotis fontana*, Brid.—Abundant in marshy places, Vadsö, Bodö, etc., c. fr.

*Leptobryum pyriforme*, Wils.—Common by the roadside at Vadsö, c. fr. This moss must be able to accommodate itself to a great variety of environment, as I have seen it luxuriating in an English orchid house.

*Webera polymorpha*, Schp.—Damp earth by the roadside, Vadsö, c. fr. *W. nutans*, Hedw.—Common and very variable, often on Sphagnum; Horre Pass, Harstad, etc., c. fr.; the var. *bicolor*, Schp., occurred in marshy ground at Hammerfest. *W. annotina*, Schwgr.—Common on the terminal moraine of the Böjum's Glacier, Mundal, on a branch of the Sogne Fiord, with abundant fruit and gemmæ.

*Bryum turbinatum*, Schwgr., var. *schleicheri* (?)—A moss with a long seta and with the capsule contracted below the mouth, but with foliage rather like that of *B. palleus*; occurred in marshy ground at Vadsö and Elvenes, c. fr. *B. intermedium*, Brid. —Waste ground near Vadsö, c. fr. *B. pallescens*, Schleich.—Peaty ground, Vadsö, c. fr.

*Mnium cinclidioides*, Hübn.—Bogs, Bodö and Elvenes. *M. rostratum*, Schrad.—Marshy ground, Vadsö. *M. subglobosum*, B. and S.—Bogs, Vadsö, c. fr.

*Cuiclidium stygium*, Sw.—In scanty patches in the bogs near Vadsö, c. fr.

*Fontinalis squamosa*, L.—A rather delicate form was common in a running stream at Elvenes.

*Antitrichia curtipendula*, Brid.—Rocks near Fantoft, Bergen.

*Leskea nervosa*, Myrin.—Rocks at Vadsö and Tromsö.

*Pseudoleskea atrovirens*, B. and S.—Rocks, Vadsö.

*Climacium dendroides*, W. and M. Abundant, but barren, in many places; principally in the southern parts of Norway by streams. A very dwarfed form occurred at Vadsö.

*Lescurœa striata*, var. *saxicola*, B and S.—Not uncommon on loose stone walls on the route to Odde.

*Brachythecium rivulare*, B. and S.—Bogs near Vadsö; a rather pale yellowish form. *B. glaciale*, B. and S.—Rocky ground near Tromsö.

*Eurhynchium teesdalei*, Schp.—Base of a rotten birch-stump, Elvenes, c. fr.

*Plagiothecium pulchellum*, B. and S.—Rocks, Vadsö, c. fr. *P. striatellum*, Lindb.—Rotten trunk of a fir, Molde, c. fr. The capsules are only very slightly striate, but the leaves have the conspicuous hyaline auricles characteristic of this species.

*P. denticulatum*, B. and S.—Stumps near the Lerfoss, Trondhjem, c. fr. *P. lætum*, Schp.—Rotten birch-stump, Elvenes, c. fr.

*Amblystegium serpens*, B. and S.—Stumps, Elvenes, c. fr.

*Hypnum fluitans*, L.—Bog, Harstad. *H. exannulatum*, var. *purpurascens*, Schp.—Marsh, Horre Pass, c. fr. The var. *stenophyllum*, Wils., occurred at Vadsö. *H. uncinatum*, Hedw.—Bogs, Bodö and Molde, c. fr. *H. revolvens*, Sw.—Very common in bogs at Elvenes, c. fr., with the var. *cossoni*, Ren. *H. commutatum*, Hedw.—Bog at Bodö, c. fr. *H. palustre*, L.—Stones by a stream, Harstad, c. fr. *H. alpestre*, Sw.—Stream, Elvenes, c. fr. *H. dilatatum*, Wils.—By a waterfall, Mundal, c. fr. *H. scorpioides*, L.—Common in bogs at Elvenes and Bodö. The specimens from Elvenes are green, while those from Bodö are of a dull purplish colour. *H. trifarium*, W. and M.—Bogs, Vadsö, not uncommon. *H. cordifolium*, Hedw.—Elvenes. *H. giganteum*, Schp.—Common in a bog at Harstad. *H. sarmentosum*, Wahl.—Rather common in bogs at Vadsö and Elvenes, c. fr. A dark-purplish, almost black, form of this moss occurred at Vadsö.

*Hylocomium splendens*, B. and S.—Abundant in woods near Trondhjem, c. fr. *H. loreum*, B. and S. —Very common in a fir wood near the Lerfoss, Trondhjem, c. fr.

*Lewes; February 3rd, 1897.*

# THE DIPPER.

By Robert Godfrey.

As we trip gaily along over the heather and through the brackens that adorn the sides of our Pentland hill streams, following their zigzag course, we have a more or less constant companionship with the characteristic bird of our burns, the dipper (*Cinclus aquaticus*). He usually awaits the traveller's approach before darting from his retreat beneath the bank, or his perch on a rock, and, with a merry "ching-ching," he flies close to the surface, and, plunging into the water just short of a stone, swims towards it. There he bobs up and down and looks in turn to all the points of the compass, displaying at one time his dark back, at another his white breast. He advances before us by short flights from stone to stone, sometimes entering the water and disappearing beneath the surface for a moment, then rising and swimming to the next stone, and eventually, taking a long flight to be rid of our disturbing presence, disappears behind a bend in the stream. We follow on cautiously and carefully, and find him perched on a stone up stream, far enough off to consider himself safe. He is preening himself after his morning's operations, and, having finished this duty, he rests in peace by the bank. We watch him through our glass, and see his white eyelid appearing regularly as a glittering mark on his ash-coloured head. But our patience is tried sorely as we continue to wait his pleasure.

After a long idle halt he resumes his hunt for food, and, crouching amongst the pebbles by the side of the stream, he picks slowly, with many inquisitive glances before him. Leisurely he walks on the bottom, and keeps bobbing gently, though restlessly. His head is lowered, and now he stands up to the body in the water. At each thrust of his beak amongst the pebbles or sand he sends a few drops of water into the air, and, when he passes beyond his depth, he swims across the little pool to the shallows on its opposite edge and picks around the bases of the larger stones, or mounts them, to secure food from their exposed surfaces. He knows well where the animal life is concealed, and, moving along through the water, inserts his beak beneath the smaller stones and by a sudden jerk turns them over, quickly seizing the tiny creatures so exposed. Considering his size he turns over large stones, but has of course an advantage in the water by means of which the weight of the stone is decreased, and when he finds one that resists his efforts he does not delay beside it but passes on. He feeds chiefly in the shallower parts of the stream, but is an adept at securing food in deeper water also, and he often proceeds along the burn by a series of dives and short flights. From a stone he plunges into the water, wriggling greatly as he enters, as if flying under though also struggling against the current; shortly afterwards he reappears, and after a short swim wriggles under again. Whilst feeding he keeps silence; but when approached too closely he ceases to feed, and, after bobbing repeatedly to us, flies off with a cheery call.

The dipper sings throughout the year, but his song always seems more beautiful in the winter months, as then it has few rival productions to cope with. The dipper is no high-class musician, but dearly he loves to sing his rough clinking notes, with their occasional thrill, to himself; he cares not though no listener be at hand to hear, and when his mate is brooding over her eggs he sits beneath the bank of the stream and delivers his strain to the moorland waste. Often when winging his way along the stream he will alight on the grassy bank or on a stone and raise his head to sing. The beauty of the song is greatly enhanced by the solitude where it is delivered; it is one of the characteristic moorland sounds. Splendid, however, as his song is in his loneliness, when he sings to himself and unknowingly cheers the wanderer, it lacks the power and the tenderness imparted to it when the bird sings in the presence of his mate. Then he becomes entirely oblivious of everything and falls into an ecstasy. No other British songster known to me is so overpowered by his song, none so loses possession of himself as he does. I have watched him on a tree-stump become suddenly enraptured on the approach of his mate; he stretches his neck and opens his wings in the attitude of a young bird about to be fed, and now he stands erect and flutters his wings continually, yea, he shivers all over as he sings boldly and cheerily in the frosty air. How simple, how happy their joy! She listens attentively to the happy strain, and bobs up and down in glee, actually seeming to dance to the music; but she likes not our presence and fears for her companion's safety. She approaches nearer till she actually seems to dislodge him from his perch, and the two fond lovers fly together down the swollen stream, "ching-ing" continuously as they fly. How the mountaineer's heart thrills with joy when he hears the ringing sound break the silence of the snow-clad hills, and when he thinks of one little songster at least rejoicing in the cold.

During the nesting-season each pair of dippers seems to have their own territory, to which they restrict themselves. When a stream flows through

a long hollow and receives many small tributaries we generally find one pair of birds on every streamlet, whose nesting-ground is commonly near the junction with the larger water, and on the main stream itself we find pairs of birds established at short intervals. The birds begin to build early, and year after year they frequent the same locality, not necessarily choosing the same site, but settling at least in some spot near the old haunt. Wherever a stream forms a waterfall a pair of dippers will settle there, and, if undisturbed, remain year after year. Over the largest pool in the best waterfall of the Pentlands there is one such constantly occupied site, and the nest is entirely safe, except from such foul processes as stone-throwing; and other frequented waterfalls on the same hills are known to me. Bridges also afford a great attraction, and there are several, over which high-roads as well as private paths run, yearly tenanted. Many varying positions, however, are chosen by the birds—amongst the rocks, by the edge of the water, or beneath the bank. At one time the nest is fastened to the top of a small bridge, at another hidden at the further end of a hole in the masonry; now we see it attached to a conspicuous stone overhanging the water, and again, by seeing the bird fly towards it, we observe it carefully screened beneath a ledge of rock about twenty feet from the level of the bank and at some distance from the water.

When placed in an exposed position, as, for example, amongst rocks, it is firmly made of moss; but when built in a sheltered site, as in a hole, it is less firm. The nest proper is made of hay, with a thick lining of beech-leaves. This, however, is always placed under a dome. In the case of a natural dome the bird may rest content with its simple form of nest, and in one such instance which came under my observation a pair of grey wagtails occupied the same spot after the dippers had left it. Far oftener, however, the nest is placed in an open site, and then a closely-woven dome of hay and moss wholly covers it, the dome being the first-formed portion of the nest. It harmonises well with its surroundings, or else appears as a heap of rubbish casually blown together; and as, moreover, the entrance of the nest is completely hidden from view, unless we look up at it from beneath, it is easily passed over by those unacquainted with its nature. The eggs—pinkish-white owing to the yolk showing through the delicate shell, but pure white when blown or hard-sat—are laid at the end of March and beginning of April. Till the full number, five or six, has been deposited, the birds keep at a respectful distance from their abode, but as soon as the hen begins to sit she broods closely and does not often reveal her nest by flying out. It is an easy matter to catch a dipper on its nest, but it is needless cruelty to do so. I have seen another act thus, and could repeatedly, had I been so inclined, have done the like; but I have contented myself with admiring the confiding bird. She bears the scrutiny well, as she sits with her bill projecting down towards us and her dark eyes gazing upon us with a look that seems to indicate that she will not move from her post till forced, the white-breasted bird appearing through the circular hole like a picture set in a frame. When the dipper flies suddenly out of her nest she usually, from its shape and its proximity to the stream, tumbles into the water before she can get rightly on the wing. I have known a case where a dipper laid in the same nest after its first eggs had been taken.

When the young birds are fully fledged they will, on being disturbed, fly out and fall into the water. When first I was the means of unwittingly causing this action I was much perplexed about the youngsters, fearing they would be drowned; but when on a subsequent occasion, with the full knowledge of what would at once happen, I inserted my finger into a nest containing ripe young I was under no excitement and ready to watch their movements. The birds were looking down the hole, and on being disturbed fluttered to the water, then along its surface, down stream, "chinging" as they went. By short flights, such as they were capable of, and by swimming during the rest of the excursion, they soon disappeared. Sometimes they seemed to be overcome by the current and to be driven on helplessly beneath the surface, but they ever again emerged to hurry onwards. On finding places of hiding they ceased crying and remained quietly in the nook they had discovered. Further down the burn, however, I was informed by cries that one of them was still afloat. It sank to the bottom, then rose again and swam onwards, using its wings to aid it, and finally coming to a halt on a stone that did not project above the water. I passed it, and at once it swam up stream against the current, till it found a convenient bank beneath which to hide. From this it may be judged how well these birds can perform the duties necessary in after life, when, on being suddenly called upon to do so without any previous practice, they show themselves to be such adepts both on and under the water.

46, *Cumberland Street, Edinburgh;*
*February 9th*, 1897.

ERRATUM.—*Ante* page 242, col. 2, line 28, after "pine needles," read—"which usually fills up old crows' nests removed."—R. G.

ADDITIONS TO BRITISH MOLLUSCA.—The "Journal of Conchology" is publishing a valuable list of the additions to the conchological fauna since the appearance of "British Conchology." The new list has been prepared by Mr. J. T. Marshall, whose notes should be read in connection with the older work.

# THE MIGRATION OF BIRDS.

(*Continued from page* 278.)

## GEOGRAPHICAL.

THE Report treats the subject from the geographical point of view thus:

"*General.*—In passing from their summer to their winter haunts, birds proceed from a northern to a southern clime, and *vice versâ* in the spring. It does not at all follow, however, that these seasonal haunts are reached by a single movement from north to south, or the reverse. Each species or individual of migratory bird has its particular summer and winter resorts, and these do not necessarily lie in the same meridian—indeed this is often far from being the case. To attain these particular seasonal habitats many of the voyagers must depart more or less considerably from a direct course. This is especially the case in western Europe, where, owing to the south-western extension of the land-masses, and the consequent irregularity of the coast-line, various more or less devious routes must be and are followed. The interposition of the British Islands between the north-western portion of the Continental area on the one hand and Iceland and Greenland on the other is an important additional factor in this deviation. . . .

"The chief and most interesting movements from the geographical standpoint are the intermigrations between our islands and Europe. There are, however, a number of movements between the various sections of the British and Irish areas which are of considerable importance.

"*Intermigration between Britain and Northern Continental Europe.*—Between Britain and Continental Europe travel a host of migrants which are either birds of passage on, or winter visitors to, our shores. The former visit our eastern coast-line in spring when journeying to their northern summer haunts lying to the north-east of Britain, and again in autumn when returning to their winter quarters to the south of our islands. The winter visitors are chiefly individuals from the ranks of certain species of the birds of passage which winter in the British area and emigrate to the north-east in the spring.

"In the autumn these numerous migrants cross the North Sea and arrive on the east shores of Britain at points between the Shetland Isles and the Humber or the northern seaboard of Norfolk. All the movements do not necessarily cover this extensive stretch of coast-line, but such is not infrequently the case. Indeed, as a rule, they are recorded from the greater part of the region indicated. It is possible to define the southern limit on the coast at which these birds strike Britain with a considerable degree of precision. No section of the British coast is so well equipped with light-stations as that which lies between the north coast of Norfolk and Dungeness. In addition to an average number of lighthouses there is a fleet of lightships off the coast which are most favourably situated for recording the movements of birds crossing the North Sea to the English coast. These lightships have furnished the Committee with some of the most carefully kept records to be found among the returns, and it is a very significant fact that these great autumn immigratory movements are not observed at these south-eastern lighthouses and lightships. Evidence of a particularly important nature in this connection is also afforded by the records kept at the Outer Dowsing Lightship, the most isolated of the stations in the North Sea, situated about thirty-eight miles east-south-east of the mouth of the Humber. At this station these important movements are not observed, another significant fact, indicating unmistakably that these migrants pass to the northward or westward of this lightship.

"The conclusion at which I have arrived, after a long and careful study of the records, is that these immigrants and emigrants from and to Northern Europe pass and repass between this portion of the Continent and Britain by crossing the North Sea in autumn in a south-westerly direction, and in spring in a north-easterly one, and that while the limit to their flight in the north is the Shetland Islands, that on the south extends to the coast of Norfolk. (1) During these movements the more southern portion of the east coast of England is reached *after* the arrival of the immigrants on the more northern portions.

"It is to be remarked also, as bearing upon this important point, that *all* the species occur on migration in the Orkney and Shetland Islands, but not in the Færoes. And, further, *all* the British birds of passage to Northern Europe are either summer visitors to Scandinavia or are regular migrants along the western shores of that peninsula.

"After arriving on our eastern shores, these immigrants from the north—some of them after resting for a while—move either down the east coast, *en route* for more southern winter quarters, or, if winter visitors, to their accustomed haunts in Britain and Ireland. A few occur as birds of passage on the west coast and in Ireland, which they reach by overland routes across Britain, and then pass southwards to their winter quarters. The west coasts, however, do not receive *directly* any immigrants from Continental Europe.

"*Intermigration between the South-east Coast of England and the Coast of Western Europe.*—'*East and West Route.*'—This is one of the discoveries of the inquiry. It has been already shown that the more southern section of the east coast of England does not receive immigrants *direct* from Northern Europe. There is, however, a considerable amount of migration of a particular description, and on the part of certain species, observed at the lightships and lighthouses between the Kentish Coast and the Wash. During the autumn, day after day, a stream of migrants, often of great volume, is observed off the coast, flowing chiefly from the south-east to the north-west at the more northerly stations, and from east to west at the southerly ones, across the southernmost waters of the North Sea. This will be hereafter mentioned as the 'East and West Route.' From the stations off the mouth of the Thames as a centre, the birds either sweep up the east coast, sometimes to and beyond the Tees (many proceeding inland as they go), or pass to the west along the southern shores of

"(1) The formation adopted by the migrants during passage would seem to be an extended line—perhaps a series of lines—whose right wing extends to the northern islands and its left wing to the coast of Norfolk."

England. These important immigrations set in during the latter days of September, reach their maximum in October, and continue at intervals until November. They are chronicled with wonderful precision and regularity in the returns from the stations on the south-east coast of England. They are renewed during winter on occasions of exceptionally severe cold, but the birds then pass to the westward along our southern shores.

"There are some remarkable features associated with these movements: (1) They are frequently observed for several or many consecutive days; (2) they often occur when there is an almost entire absence of bird-migration on other parts of our shores; (3) the movements appear to be entirely confined to the daytime, and are usually timed as from soon after daylight to 1 p.m., sometimes until 3 p.m.—this being probably due to, and indicative of, the shortness of the passage; (4) the autumn migratory flocks are chiefly composed of larks in vast numbers; 'black crows' (rooks), very many; grey crows, many; also numerous redbreasts, goldcrests, chaffinches, greenfinches, tree-sparrows, swallows, starlings, and occasionally woodcocks; and, during the winter, larks, various thrushes and lapwings; (5) and lastly, on certain occasions these immigrants, while passing northward along the English eastern seaboard, actually cross the movements of 'coasting' emigrants proceeding southwards. ([1])

"Whether this east to west stream is a branch of one that passes down the coast of Continental Europe, or whether it has its source in Central Europe, is a matter of conjecture. ([2])

. . . . . .

"*Intermigration between Heligoland and Britain.*—Much prominence has been given in some of the Annual Reports issued by the Committee, and in Herr Gätke's book, 'Die Vogelwarte Helgoland,' to an intermigration between Heligoland and the east coast of England by a direct east-to-west autumn and, it is to be presumed, west-to-east spring movement. Herr Gätke most obligingly communicated the details of the bird-movements observed on Heligoland for four of the years (1883-86) during which the inquiry was being prosecuted over the British area. These two sets of data have been carefully examined and comcompared, and it has been found that the dates of the chief movements of the species common to Heligoland and Eastern Britain seldom if ever correspond, and do not bear out this theory; that particular species which are irregular as migrants in Britain, such as the ortolan bunting and others, occur regularly, often indeed in 'rushes' at the more favoured isle off the mouth of the Elbe; that other species which are very rare on our British Isles occur in Heligoland as regular migrants and in considerable numbers, as *Motacilla flava*, *Anthus richardi*, etc.; while species common to both islands occur in 'flights like clouds,' in 'hundreds of thousands,' 'thousands upon thousands,' in 'marvellous numbers,' 'astonishing flights,' and so on, at Heligoland, at periods when there is not a single observation for the same species on the English shores. A study of the phenomena of migration at the stations on the east and west sides of the North Sea compels the investigator to come to the conclusion that Heligoland and Britain draw their migratory hosts from different sources. . . .

"*Intermigration between Britain and Faroes, Iceland and Greenland.*—The Faroes, Iceland and Greenland, are the summer home of several Palæarctic species which occur as birds of passage on the British coasts. The majority of these visit Iceland, and Greenland claims only two or three of them (wheatear, white wagtail and whimbrel). It is natural that these birds being of strictly Old World species, our islands should lie in the course of their migrations. It is quite possible that these migrants may pass along both the eastern and western coasts of Britain and the coasts of Ireland. Here, at any rate, we have evidence that these birds are observed on passage on our western shores. It may be that some of the birds proceed also along our eastern seaboard, but this is a point difficult to determine. There is good evidence, however, that important movements of redwings, wheatears and whimbrels are observed on the western coast of Great Britain and the Irish coasts (both east and west as regards the passage of the whimbrel) which are not observed elsewhere. Such a fact points to the independent nature of these west-coast flights, and indicates that, in some instances at least, the western route alone is followed.

"It is thus evident that, so far as concerns the movements of the birds of passage to and from their northern breeding haunts, the British east and west coast migratory movements are very distinct in their characters. The west coast does not receive immigrants direct from Europe, nor do these Continental breeding species depart from its shores in the spring. Indeed, it is quite remarkable how rare, or comparatively rare, certain well-known east-coast species are on the western points of our shores.

"*Intermigration between Great Britain and Ireland and the South, etc.*—Having shortly described the migratory movements between the British Islands and Northern and Western Europe, undertaken by birds of passage and winter visitors to our Islands, the routes on our coasts along which the summer visitors travel to and from their breeding quarters in Great Britain and Ireland now demand attention in their geographical aspect. It will be convenient also to refer to the routes between the different portions of the British area under this division.

"The autumn or emigratory movements will be described—but it is necessary to remark that the data clearly indicate that the spring migratory movements along our western shores are simply return movements on the part of the same species along the same lines of flight as those laid down for the autumn.

"The movements of these groups of migrants will be treated of under the various sections of our coasts. The first movement on the part of all emigrants among British birds is to the coast, which is reached in some cases, no doubt, by particular inland routes.

"*East Coast of Great Britain.*—The emigratory movements on the east coast are very simple in their geographical aspect. When the coast is reached, the emigrants follow the coastline southward, gathering strength as they go, and finally quit our shores at various points on the south coast of England.

"([1]) It is probable that such species as the golden oriole, hoopoe, etc., which occur annually during spring and autumn migration in southern and south-eastern England, and the black redstart as a winter visitor, are birds that proceed along this route to and from our islands."

"([2]) There are no essentially northern species recorded for this route, and the occurrence of the rook so frequently and in such numbers is suggestive of a Central (western) European source."

"It is during such autumnal movements that the more southern coastline of Eastern England and its off-shore fleet of lightships record night migration. The ranks of the British emigrants are, as we have said, recruited as they fly onward, and if a great movement should be in progress the causing-influence will affect also many birds of passage which may be sojourning on our shores. Two wings of the migratory army thus combine, and a great 'rush' to the south is the result.

"*West Coast of Great Britain*.—The emigratory movements which pass down the west coast are far from being so simple in their geographical details as those observed on the east.

"That such should be the case is not surprising. Here we have Ireland, the Isle of Man, the Hebrides, and an extremely irregular coastline exercising their varied influences. In addition, there are intermigrations between these off-lying isles and the mainland, and often movements of an independent nature in some portion of the western area.

"The general route followed by these departing birds has its north-western source in the Outer Hebrides, and after leaving Barra Head it joins an important stream from the Inner Hebrides at Skerryvore. The course then followed is *viâ* Dhuheartach, Islay, the Wigtonshire coast, the Isle of Man, Anglesey, and the South Bishop (off Pembrokeshire). Finally, the south-western coast of England is reached (possibly in part by an overland route across Devonshire and Cornwall) between the Scilly Islands and Start Point.

. . . . . .

"In connection with these movements there are several more or less important features to note. (1) The English shores of the Irish Sea, *i.e.* the coasts of Cumberland and Lancashire, lie off the main line of these movements. (2) The north coast of Ireland, which seems to lie right in the course of the birds and which would naturally be expected to come in for a considerable share of such movements, appears to be only occasionally affected by them. (3) The Irish contributory movements when they occur are chiefly, nay almost entirely, observed on the southern, and especially on the south-eastern, coasts. (4) The south-western coast of England and Wales—*i.e.* from the mouth of the Bristol Channel to the Land's End and the Scilly Isles—appears to be especially affected when there are considerable movements on the southern and south-eastern coasts of Ireland, implying that there is much intermigration between these particular portions of the English and Irish coasts. Sometimes, however, these emigrations from Ireland only affect the south-west coast of England from the Bishop's Rock (off Scilly) to Start Point.

"*Irish Coasts*.—The Irish chronicles have been most excellently and carefully kept, and the returns of specimens killed against the lanterns at the stations have been larger and more valuable than those furnished from the coasts of Great Britain. The coasts of Ireland do not constitute in themselves a main highway for birds, though . . . the majority of the migrants observed on the shores of the sister isle are probably the migratory members of her own avifauna. The movements of departing birds during the autumn at the southern and south-eastern stations . . . occur simultaneously with similar movements passing down the western coast of Great Britain, and the two streams meet and unite at points between the Bristol Channel and the Scilly Isles. Some of the Irish autumnal flights, however, are quite independent of these general movements.

"There is much evidence to show that not only do the autumnal emigrants depart from the south-east coast of Ireland *en route* for more southern winter-quarters, but also, strange to say, that many birds (*e.g.*, thrushes, redwings, blackbirds, chaffinches, greenfinches, linnets, starlings, larks) almost simultaneously *enter* that county by this very same section of her shores, in order to winter within her limits. These immigrants are often observed arriving from the south-east in great numbers for several days in succession. The English west coast observations also bear evidence that such movements proceed across St. George's Channel in a north-westerly direction. These cross-channel flights are usually observed during the daytime, but sometimes the arrival of certain of these birds on the Irish coast takes place during the night. . . . Independently of and in addition to these main Irish migratory movements, thrushes, larks and starlings occur in October and November on the northern coasts of Ireland, from Tory Island to the Maidens, as immigrants from Scotland. . These are to be correlated with movements of the same species observed at the Rhinns of Islay and the Wigton coast. Larks, too, are often recorded for this route during the daytime. There are also autumnal movements between Ireland and England and Wales by an east-to-west flight across the Irish Sea, on the part of starlings, chaffinches, greenfinches, larks, and sometimes of various species of thrushes. Anglesey is the chief Welsh point, and Rockabill (off the north coast of Co. Dublin) the main Irish station at which these departures and arrivals are observed. The migratory movements observed on the west coast of Ireland are neither many nor important. . . .

"*South Coast of England*.—It is much to be regretted that observations relating to the migrations of birds on the southern coast of England *as a whole* where not obtained by the Committee. The data bearing upon this important English coast-line are from a few stations on the south-eastern and south-western portions only. This information points to (1) a considerable amount of migration taking place between these portions of the coast-line and South-western Europe, and (2) important movements passing *along* the entire coast-line from east to west in autumn and probably *vice versâ* in spring. The south coast is naturally the great scene of the arrival and departure of migratory birds of all descriptions, but the movements along shore are, perhaps, in some of their aspects, more interesting. Regarding these last, much remains to be ascertained concerning their precise nature and the destination of some of the birds travelling along this route.

"In the autumn this coasting stream of birds has its source chiefly in the immigratory movements from the Continent across the southern waters of the North Sea by the East and West Route, of which it is but a continuation. It is possible also that British emigrants after passing down the east coast of England may turn to the westward and skirt the south coast, but this is not shown with certainty. The Continental immigrants strike the Kentish shore, and, as has been already stated, some pass to the north along the east coast of England, while others pursue a westerly course along our shores of the channel. The stations on the south-western coast again record these migrants, and the probable destination

of many, perhaps most of them, is Ireland, on whose south-eastern shores the birds are chronicled, almost simultaneously, as arriving in great numbers from the south-east.

. . . . . . .

"The great autumnal movements from east to west along the south coast of England are renewed in winter, when that season is characterized by periods of unusual cold. At such times it is possible that this western stream is composed in part of native emigrants which have passed down our eastern coasts, as well as of birds of continental origin.

"*Channel Islands.*—Records from the Hanois Lighthouse, situated some two miles off the west coast of Guernsey, were furnished for each of the years of the enquiry, and afford some useful information. These, when compared with the English and Irish chronicles, show that on nearly every occasion on which considerable migration was observed at this station in the autumn, there was also much emigration going on practically simultaneously on the south-west coast of England. It is necessary, however, to state that a number of important movements on the south-west coast of England do not appear in the records for Hanois, indicating, perhaps, that many movements to the south in autumn and to the north in spring pass to the westward of this station. In the spring, swallows are observed passing to both the north-east and north-west in great numbers during April and May, and a number of other summer birds are recorded on passage.

"SEASONAL.

"The seasonal section of the Report is readily subdivided for treatment in autumn, winter and spring. . . . In the autumn the birds, when they appear on our shores, have accomplished *the* great business of the year — procreation. Food is still abundant in their favourite resting-haunts, and hence there is no particular hurry to move southwards. Thus many species tarry on our coasts or in their vicinity, some for a considerable period. Their numbers are, of course, incomparably greater than during the northward journey, as they are swelled by the numerous young birds, now a few weeks old. All these circumstances and conditions combine to make the autumn movements comparatively easy of observation.

"In spring the conditions are quite different. The all-absorbing duties of the season and the procreative influence are upon the voyagers, and since our islands form one of the last stages in the journey of many species, the birds usually hurry on after a short sojourn for rest and food. All that it is necessary to say here regarding the winter movements is that they are entirely the effect of severe weather.

"*Autumn Immigration.*—As the summer, more particularly the Arctic summer, is at its height during July, it is not to be expected that immigrants among the northern summer-birds would appear on our shores on their return journey during this month. The initial movements of the autumn, whatever their significance may be, do, as a matter of fact, set in towards the end of July. Of the species observed, the whimbrel and the knot are the most frequently recorded. The green sandpiper, curlew sandpiper, bar-tailed godwit and turnstone are less frequent. A few others appear only occasionally in the chronicles of the month. In all probability these July immigrants, or the majority of them, are non-breeding birds of their respective species, which have not, perhaps, proceeded far beyond the limits of Britain on their spring journey northward. That such is the case is borne out by the fact that these July birds are *all*, so far as reported, adults. Immigration sets in in earnest during August on the part of those species breeding northwards beyond the British area, and either occurring as birds of passage or as winter visitors to our isles. The former include the northern representatives of several species which are summer visitors to Britain. The return movements of twenty-six species of birds whose summer haunts lie entirely beyond the British area are chronicled for the month. During September a marked increase in immigration takes place as regards both species and more especially individuals. In all, over forty species of European birds which do not summer in Britain are recorded as migrants for September, including all the species regularly recorded for August. In some years (1881 and 1883) there have occurred in September the first of the great autumnal 'rushes' of immigrants from the north to our shores. These decided movements are, however, entirely the effect of meteorological conditions at the seat of emigration, of which special mention is presently to be made in the Meteorological Section. In October the flood of immigratory birds reaches its highest level, and there are experienced those vast 'rushes' upon our shores just mentioned. The additions to the list of extra-British breeding species are comparatively numerous, forty-seven species of regular birds of passage, besides many other birds breeding in both northern Europe and Britain, being recorded. . . . The immigratory movements occurring in November are not only on a very much reduced scale, *but after the middle of the month the immigration of such birds as spend the summer in the north entirely ceases,* with the exception of those of certain marine species (ducks, gulls, grebes, swans) whose late movements to the south are dependent upon severe weather conditions. This is entirely contrary to the views hitherto propounded regarding the limits of these movements, but it is, nevertheless, a fact well established by this inquiry. . . . The immigrants hitherto considered are those derived from the north. There now remain for treatment those which reach us by a westerly movement along the east and west route, and arrive on the south-eastern shores of England. These diurnal movements set in during the latter days of September, when larks, 'crows' (rooks), tree-sparrows and some redbreasts are observed. Immigration increases in volume in October, when in addition to the species mentioned, blackbirds, thrushes, grey crows, chaffinches, greenfinches, goldcrests and, occasionally, woodcocks are observed. The movements continue until the middle of November, when they too, during ordinary seasons, cease to be observed. They are renewed again, however, on the part of larks, starlings, thrushes and lapwings on the advent of great cold, when the birds chiefly pass westwards along the south coast of England.

"During immigration our shores are reached during the late night or early morning on the part of migrants from the north. On the contrary, the immigratory movements from the east, across the narrows of the North Sea, appear to be performed during the daytime.

(*To be continued.*

# ARMATURE OF HELICOID LANDSHELLS,

## With a New Section of Plectopylis.

By G. K. Gude, F.Z.S.

(*Continued from page* 276.)

BEFORE resuming the consideration of other Burmese and Indian species of Plectopylis, I will deal with a small section of the genus characterized by a thin and transparent shell and a peristome with straight, acute edges. Two species only have hitherto been known, *P. clathratula*, from Ceylon, and *P. retifera*, from India; but a third undescribed form, also from India, has been communicated to me by Colonel Beddome: two species from Ceylon, described and figured by Dr. F. Jousseaume in the "Memoires de la Société Zoologique de France," vii. (1894), pp. 277 and 278, t. 4, ff. 1 and 8, have been referred by him to *Plectopylis*, and, if correctly thus referred, they will doubtless be found to belong to this section, for which I propose the name *Austenia*, in

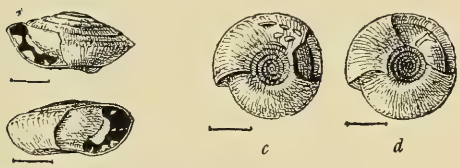



Fig. 42.—*Plectopylis clathratula.*

honour of Lieut.-Colonel Godwin-Austen, who has contributed so largely to our knowledge of the genus.

*Plectopylis clathratula* (figs. 42*a-d*), from Ceylon, was described by Dr. Pfeiffer in the "Zeitschrift für Malakozoologie," vii., (1850), p. 67. It was figured in Reeve's "Conchologia Iconica," t. 65, f. 336 (1852), in Martini und Chemnitz's "Conchylien Cabinet," 2nd ed., iii., t. 127, ff. 17–20 (1853), and in Hanley and Theobald's "Conchologia Indica," t. 132, ff. 1–4 (1875). Mr. Benson described what he thought was a new species, under the name of *Helix puteola*, in the "Annals and Magazine of Natural History" (2), xii. (1853), p. 92, but he subsequently pointed out its identity with Dr. Pfeiffer's species (loc. cit. (3), v. (1860), p. 247). It was also figured under Mr. Benson's name by Reeve, op. cit., t. 190, f. 1334 (1854). Mr. G. Nevill (Hand List, p. 70) records *P. clathratula*, as in the Indian Museum, Calcutta, from Balapiat, Sikkim; but I doubt the correctness of the identification of the specimens referred to and think they will probably prove to belong to the new species to be described in the next article as *Plectopylis clathratuloides*.

As the armature of *Plectopylis clathratula* has never been figured, I am pleased to have an opportunity of illustrating it. The shell is somewhat lenticular, widely umbilicated, pale corneous, transparent, showing the palatal armature distinctly through the shell-wall. It is finely and regularly striated by raised ribs, which are more prominent above than below, it is acutely keeled at the periphery, and has two raised spiral ridges revolving near the peripherial keel and ascending as far as the second whorl. It is composed of 5½ slowly increasing whorls, a little convex above, inflated around the wide and deep umbilicus. The base of the shell is shining. The peristome is simple, straight and acute, the left margin being a little reflected over the umbilicus. The parietal armature consists of a single, slightly oblique, vertical plate, which is slightly twisted and a little notched in the middle, and gives off posteriorly above an obliquely ascending support (see fig 42*d*, which shows the shell with part of the outer wall removed). The palatal armature appears to be somewhat variable, and consists of various denticles, arranged principally in two horizontal series, midway between the periphery and the umbilicus. In the specimen figured, which is in Mr. Ponsonby's collection, the first series consists of: posteriorly, a short, strong, flattened vertical tooth, and anteriorly, two short, slight, horizontal denticles, separated by a short space, the second series consists of: posteriorly, a short, flattened, vertical tooth, a little smaller than the one above it, and, anteriorly, a short, oblique, curved denticle. Below these two series is a longer, but thin, horizontal fold, coincident with the umbilical angulation, while above the vertical tooth of the first series is a minute, horizontal denticle, coincident with the peripherial keel. The specimen measures 5 millimetres in diameter. (Fig. 42*a* shows both armatures from the posterior side, the anterior palatal denticles being hidden by the posterior teeth; fig. 42*b* gives the anterior view of both armatures, but the posterior tooth of the first series is here hidden by the parietal plate; fig. 42*c* shows the palatal folds as they appear from below through the shell-wall; all the figures are enlarged.) Two specimens in my collection—measuring, major diameter 6 millimetres, minor diameter 5·5, axis 3 millimetres—have the anterior portion of the first series, consisting of four horizontal denticles, the first two close together, the third a little smaller and further distant, and

the fourth still smaller and still further distant; the anterior portion of the second series possesses, in addition to the oblique curved denticle, a slight, straight, horizontal denticle. Another specimen, also in my collection, measuring 5·5 millimetres in diameter, has three horizontal denticles in the first series, while the second series is similar to that in my other two specimens. It possesses, however, in addition, one posterior and two anterior denticles of a previous set, separated from the mature set by a distance of 1 millimetre.

*Plectopylis retifera* (figs. 43*a-c*), from South India, was described by Dr. Pfeiffer in the "Proceedings

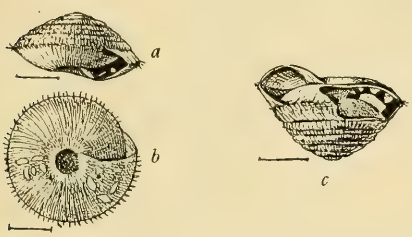



Fig. 43.—*Plectopylis retifera.*

of the Zoological Society," 1845, p. 73, and figured in Reeve's "Conchologia Iconica," t. 173, f. 1170 (1853), and in Hanley and Theobald's "Conchologia Indica," t. 87, ff. 8 and 9 (1872). As the armature has never been figured, I am glad to have an opportunity of doing so. The shell is convexly conical, narrowly umbilicated and acutely keeled; it is dark corneous, translucent, finely and regularly plicated by raised ribs above, finely and closely ribbed below. The periphery has an acute, compressed keel, above which revolve two raised spiral ridges, which can be traced to the embryonal whorl, the lower one being provided with a fringe of coarse hairs. The shell is composed of 6½ slowly increasing convex whorls, while the base is flattened and shining, a little tumid round the umbilicus, which is deep and narrow, suddenly widening at the last whorl. The aperture is subquadrate and elongated; the peristome is simple, acute, scarcely reflected below. The parietal armature consists of a single, strong, vertical plate, slightly sinuate, but not notched, giving off a slight support anteriorly a little below the upper extremity (see fig. 43*b*, which shows both the parietal and palatal armatures from the posterior side). The palatal armature is distinctly visible through the shell-wall, and consists of two series of denticles, the upper series is composed of: posteriorly, a strong, short, vertical, flattened tooth, and, anteriorly, a minute, horizontally elongated denticle, in a line with the base of the posterior tooth; the lower series is composed of: posteriorly, a smaller, flattened, vertical tooth, and, anteriorly, in a line with its top, a minute, horizontally elongated denticle, and, in a line with its base, a larger denticle, elongated obliquely. Above the periphery occurs, in addition, a small, horizontal denticle, and below the umbilical angulation a short horizontal fold. The two specimens figured are in Mr. Ponsonby's collection, and measure 6 millimetres in diameter. The one shown in fig. 43*c* is not quite mature, the newly-formed palatal armature, near the aperture, consisting of only one horizontal and two vertical denticles. Colonel Beddome has obligingly allowed me to inspect a large series of specimens of this species from the Tinnevelly Hills; of these, nine full-grown specimens possess only one set of denticles; five not quite full-grown specimens possess two sets of denticles each, the older (immature) sets being complete, while the newly-formed sets consist of one, two, or three denticles; four immature specimens have only one set of denticles; ten immature specimens possess two sets of denticles. Of the ten specimens last mentioned, three have the older set complete and the newer set partly formed, five have the older set incomplete (partly absorbed) and the newer set complete, while, finally, the two remaining specimens have both sets complete. It may, therefore, safely be inferred that the older set does not become absorbed until the new set is completed. In a few instances I have observed that the two lower anterior denticles have become fused.

(*To be continued.*)

## HEINRICH GÄTKE.

By H. Kirke Swann.

THE past eighteen months have been remarkably fateful in having removed from the ornithological world several whom their acquaintances and the cause of science, and even the world in general, heedless of such men as it usually is, could ill afford to lose.

Turning over in one's mind the four or five names in question, it is hard to say—great as the loss of each has been—whether any one of them has been a greater to the cause of pure knowledge than the latest addition to the list, Heinrich Gätke, who passed peacefully away, on the first day of the new year, out on the little island in the North Sea which had for sixty years been his uninterrupted place of residence.

Herr Gätke was born on May 19th, 1813, at Pritzewalk, Mark Brandenburg, where also he received the scanty education which the times and the manners vouchsafed to the young in that locality. It appears that his talents were directed from an early age to art, and it seems to have been

with the object of studying marine painting that he went to Heligoland about the year 1836; but he had not long been on the island before he contracted an acquaintanceship which led to his marrying and making it his home for the remainder of his life.

The keen interest in ornithology, which was afterwards to make him famous, appears to have developed itself not long after his arrival on the island. It quickly led to his beginning to form a collection of the stuffed skins of such birds as came in his way, and also to his commencing the journal of observations which he kept with such unfailing regularity throughout the rest of his long life. It was not until Gätke was forty years of age that the good use to which he had put his residence upon the remarkable islet first became known to European ornithologists. From this time onward Gätke and Heligoland became more and more familiar to ornithologists, and at the same time more and more inseparable. Gätke himself abated nothing of his self-imposed labours, ultimately rendering his system so perfect that the majority of the islanders were gradually pressed sufficiently into the service of the cause to be able to prove valuable allies in making observations for him.

In process of time Gätke began to filter out a portion of his vast store of information to the appreciative circle of British ornithologists. This he did chiefly through the medium of "The Ibis," and also in the shape of gratuitous data supplied to several of the ornithologists who visited the island. It was not, however, until the veteran observer was in his eightieth year that the whole of his observations and deductions were placed before the world in his "Die Vogelwarte Helgoland," printed at first in German, but afterwards rendered accessible to our countrymen in the English edition of 1895. Upon the contents of this volume it is unnecessary to dwell in this place, as its value has been and will for years to come be almost universally recognized, in spite of whatever objections may be advanced against some of the opinions adduced by its author.

The island of Heligoland itself may be described roughly as a triangular tableland, surrounded by nearly perpendicular cliffs, the almost level surface having a total area of only about one-fifth of a square mile. It is situated about forty miles from the mouth of the Elbe. The total number of species of birds enumerated by Gätke as having occurred on this "speck in the ocean" is 396, but one of this number (*Geocichla dauma*) was given in error (see "Ibis," 1894, p. 298), while some few others are recorded as having been *seen* only. On the other hand, at least one species has been added since the publication of Gätke's work.

*10, Harrington Street, London, N.W.*

## A NEW MEALY-BUG.

(Dactylopius pseudonipæ.)

By T. D. A. Cockerell.

In the January number of Science-Gossip I gave a description by Mr. Pergande of a mealy-bug found in a Michigan hothouse, believed to be *Dactylopius nipæ*, of Maskell. Mr. Pergande himself had all along inclined to the opinion that it was a distinct species, though unwilling to publish it under a new name. I had been convinced that it represented only a variety, but since then I have studied some specimens found on the leaves of a palm in a Californian greenhouse, sent to me by Mr. Alex. Craw, and am converted to the opinion that it is a distinct though closely related species. In addition to the difference in the antennæ, the new species (*D. pseudonipæ*) differs also in the colour of the male and larva, *D. nipæ* having, according to Maskell, a brownish-red male and a purplish-red larva. The following description is from the Californian material:

Dactylopius pseudonipæ, n. sp.

Female about two millimetres long, oval, bright crimson, covered with dense yellowish-white meal, which tends to elevate itself into four rows of dorsal protuberances. Sides with dense mealy tassels, pointing backwards. The female boiled in caustic alkali, stains the liquid claret colour; the contents of the body give a further reddish-brown stain, but cleared individuals are light violet. Anal ring with the usual six hairs, which are stout. Caudal tubercles quite pronounced for a *Dactylopius*, with the usual two conical spines, short hairs, and longer caudal bristle, which is not longer than and not quite so stout as a hair of the anal ring. Legs ordinary, femur tolerably slender, tarsus about two-thirds length of tibia, each with a few bristles only. Digitules slender, with distinct knobs; tarsal digitules not very long. Antennæ 7-jointed, formula 7241(63)5.

Newly-hatched larva pale lemon yellow.

Male sac ordinary, but pure white, not yellowish like the female. Male light yellow.

*Mesilla, New Mexico, U.S.A.;*
*March 7th, 1897.*

Experimental Farms. — Professor Saunders, LL.D., F.R.S.C., F.L.S., etc., Director of the Experimental Farms of the Dominion of Canada, gives his annual report of "The Results Obtained in 1896 from Trial Plots of Grain, Fodder-Corn and Roots." It is one of an admirable series upon the technical work so ably carried out under the direction of Professor Saunders at the various experimental farms under his management in the Dominion of Canada. The marked success of the investigation into the varieties of economic plants suited to the great climatic range existing in Canada, which has been carried out at these establishments, has amply justified the annual votes which the Dominion Parliament has passed for that purpose.

# MICROSCOPIC ALGÆ.

By James Burton.

(Continued from page 271.)

BEFORE going further it is necessary to explain that by *Lyngbya* is here meant the plant which Dr. Cooke, in his "British Freshwater Algæ," p. 182, names *Ulothrix radicans* (or *parietina*, for the difference is very slight), and not that now correctly understood under the name of *Lyngbya*, which belongs to a much lower group—the blue-green Oscillatorieæ.

*Lyngbya muralis* is an older name for the species intended, and has a convenience for use in this instance, as it is employed in all but the most modern books of reference. I shall take the liberty of adhering to it for that reason. The name occurs in "One Thousand Objects for the Microscope" (paragraph 472), and is apparently applied in the old sense, though the description is scarcely definite, but figs. 21 and 24, plate vi., stand for species of the same genus, *Ulothrix*, and may be taken to represent our example, for it varies very considerably in size and other characteristics, according to its circumstances and condition. It consists of unbranched filaments, composed of cells usually much broader than long, the outer wall of the row being thick, sometimes swelling in water till it is very thick and gelatinous. The colour is the distinct green of chlorophyll, an important distinction. In comparatively dry situations I believe propagation takes place solely vegetatively, by portions of the thread, or sometimes single cells only, becoming detached and developing into new filaments; but in water, certainly in some species and most probably in this, other methods occur. In non-sexual reproduction the protoplasm of some of the cells is formed into from one to eight pear-shaped bodies (zoospores) furnished at one end with four cilia, by means of which they move through the water for a time, finally attaching themselves to a suitable object, and growing up into a new plant. There is also a primitive kind of sexual reproduction. In it the protoplasm divides into a larger number of zoospores, each with two cilia; these swim about actively, and if two, originated in different cells, come in contact, they gradually unite and form one large zygospore. This comes to rest, attaches itself, and slowly grows. After a time a number of zoospores are formed in its interior, which, when set free, no doubt develop into fresh filaments, though this does not yet appear to have been actually observed.(1)

*Lyngbya* is even more widely distributed than *Prasiola*, and may be found not only on the ground, but on trees, posts, etc., and as its specific name—*muralis*—implies, seems especially prevalent on damp walls, even hanging like a green fringe from projecting corners and edges of the bricks. It is able to bear desiccation without injury, but flourishes luxuriantly when well supplied with water. For observation it may be cultivated in a saucer on a little earth, or on the pieces of wood or brick on which it may be found. Owing to the wet weather of last February, there is no difficulty in finding it at present in any quantity.

Between the filamentous *Lyngbya* and the expanded membrane-like *Prasiola* there is another form of alga found in the same situations, partaking to some extent of the characters of both; this has been named *Schizogonium*, and, as was mentioned last month, has been classified as a genus of the Ulvaceæ. It is figured in Dr. Carpenter's "The Microscope" (sixth edition, p. 294), and also in the seventh edition, as *Ulva*, and the same figure is given in the "Micrographic Dictionary" (third edition) as *Schizogonium*. The definitions are not very satisfactory, and the plant itself, as far as it is possible to identify it, varies extremely. "British Freshwater Algæ" gives: "Threads as in *Ulothrix*; or, in many places, laterally connate (duplicate or triplicate), or by cellular division in two directions, forming narrow, flat bands, which are more or less crispate."

To me, and probably to most students, the greatest interest about these plants is in connection with the statement that the filamentous *Lyngbya* will, by division of its cells in a longitudinal direction, develop inio *Schizogonium*, described above, and that this, by continuing the process and increasing only laterally, at last reaches the condition of a membranous frond and then is the actual organism known to us already as *Prasiola*.

Dr. Braxton Hicks, in a paper in the "Quarterly Journal of Microscopical Science" for 1861, pp. 157-166, says: "The only real difference between the first two is that whereas *Lyngbya* is a tube containing distinct cells within, which, when old, undergo collateral division to form a band of two, four, or eight rows of cells, *Schizogonium* is a band of two or eight rows of cells, which, when young, was but a single row contained in a tube; which is only two different ways of stating the same facts. The comparison of the last two is of the same kind. For as *Prasiola*, when old, is composed of many rows of cells, but which arose from a single row, there must have been a time in its life when it had two, four or eight rows, and thus have been a *Schizogonium*, for there is no other structural difference between the

(1) *Vide* Dr. Scott's "An Introduction to Structural Botany," Part ii.

two." And again, "The whole of these changes are so palpable, can be observed so constantly, and are at the same time so simple in their relations to one another, that one can scarcely imagine how they can have been separated not only into distinct species, but into different families of algæ. Thus the linear stage is called *Lyngbya*, the early stage of collateral segmentation *Schizogonium*, the adult stage *Prasiola*, while the gonidial growth has been classed under Palmellaceæ."

There is nothing in the above quotation but what certainly may easily be the fact. The cells composing the various forms do not differ from each other more than the cells from different specimens of any one of them. It is important also to remember that all the cells from a physiological point of view are of exactly the same value, they must all of them perform the functions of an entire plant, there is here no modification of structure in order to fulfil different duties, such as is apparent in the higher plants. Each component item is at once functionally root, and stem, and leaf, and even reproductive body too, so that the mere external form of the whole colony may well be but a secondary matter and dependent on age, or the diverse conditions of environment. Of course it is not contended that all species of *Ulothrix*, as now understood, are but the immature condition of another plant, but the one only, and its somewhat uncertain varieties which would formerly have been known as *Lyngbya muralis*. Still, the assertion does not appear to have been generally accepted as final, and though often quoted with approval, the old classification is yet adhered to. Indeed, the truth of the matter is not so easy to ascertain as might be expected. Nothing would appear to be more simple than to obtain specimens of *Lyngbya*, keep them under observation during growth (they flourish readily with reasonable treatment), and in due course they should develop through *Schizogonium* into *Prasiola*. Yet almost certainly it would be found they did nothing of the kind, but continued as *Lyngbya* still. To quote Dr. Hicks again: "There seems an innate tendency of any one form to continue and to multiply in that form in all stages of this plant, whether in the free segmenting gonidial stage, in the early half-grown or mature linear, or, later on, in any stage of the collateral mode. This property is possessed by most if not all the lower algæ, and it is this which has doubtless tended to divide into distinct species and genera forms which should have been but the links of a single chain."

Interesting as it might be, it is needless here to enter on a discussion as to the merits of Dr. Hicks' theory. I have watched the plants for several years and have grown specimens at home at intervals during the time, but find the whole of them vary so much according to season and habitat, while the descriptions in most books are so indefinite (it is mainly after all a question of definition) and even contradictory, that it would be useless to offer a decided opinion on the matter. The remark may be permitted, however, that to me it seems impossible to establish the genus *Schizogonium*. All the many specimens that have come under my observation appear to represent either a state of *Lyngbya* in which the filaments have become connate, or a young condition of *Prasiola* developed from some of the proliferations to which it gives rise. *Lyngbya* is much more common than either *Schizogonium* or *Prasiola*, it may almost be described as ubiquitous so plentiful is it, and though in the vast majority of cases it retains its own proper characteristics, and does not develop into anything else, a form does occasionally occur, and just recently I have found it in great abundance in one situation, which somewhat resembles the other two. Probably in consequence of the wet and mild winter, added to some special suitability in the site, a patch of it has grown with great vigour and luxuriance, the filaments being crowded together, have adhered to one another and united into ribbon-like structures of varying widths, according to the number of threads taking part in the process. Not infrequently this has gone so far that the result is a broad membranous frond. Now the narrower examples agree precisely with part of the definition already given for *Schizogonium*: "Threads as in *Ulothrix*; or, in many places, laterally connate [1] (duplicate or triplicate)"; while the broader ones, consisting of expanded fronds, are in general appearance like *Prasiola*. Indeed, this seems to be the form described under that name in the third edition "Micrographic Dictionary." Well marked as these structures are, they certainly do not require a specific name, their origin is evident, the actual filaments are quite distinguishable lying side by side, marked out, but at the same time connected by the thickened walls which appear like broad, almost colourless, stripes. In the wider specimens, owing to the junction of threads lying in different directions in one plane, angular spaces often occur between them, leaving openings; and the shape of the whole frond, particularly the edges, is most irregular.

Besides the interest attaching to their development, and their beauty as microscopic objects, these plants have the further attraction of bearing preparation and permanent mounting extremely well. Indeed, with very little trouble they may be preserved so as to retain their natural appearance, even to the colour, for years, so that typical specimens and their variations can be laid by for future reference. In the last October number of SCIENCE-GOSSIP we had a receipt given for a mounting fluid which would no doubt be highly

[1] Connate — "having parts united in any stage of development, which are normally distinct,"

successful, but a somewhat simpler medium answers admirably in this case. Take a small phial or test-tube, about half fill it with water acidified with a little acetic acid, and add acetate of copper, shake and allow it to settle; if the amounts are just right the liquid should appear of a clear blueish-green, with a little sediment at the bottom, showing that it is a saturated solution. It is, perhaps, an advantage, though not indispensable, to add about twenty-five per cent. of a saturated solution of salicylic acid as a defence against fungi. Pour the upper clear part off into a bottle for use. Now take the specimens, wash clean, and place in a little water in a watch-glass, add a few drops of the above fluid, and allow to stand for some hours, then add more of the fluid, allow to stand again, next dilute some glycerine with the same acetate solution and put a few drops with the specimens, after an interval repeating the application. The object of this method is that the protoplasm may not be contracted by rapid withdrawal of cell sap—technically plasmolysis—which would be the case if a dense fluid were added to the water too suddenly; the more slowly the process takes place the better the result. A still more simple method of preservation is to substitute a weak solution of sulphate of copper alone for the acetate and acetic acid, but the result is somewhat less satisfactory. The specimens thus prepared may be mounted in glycerine or glycerine jelly. If the latter is used it should be thinned with a little of the acetate or sulphate solution, as it is always too thick as sold by the dealers; it should only just set, when at the temperature of an ordinary warm dwelling-room.

I shall be pleased to forward specimens of the *Lyngbya* here described, if still obtainable when this appears, to anyone sending address and stamp for postage.

9, *Agamemnon Road, West Hampstead.*

## NOTES OF A HOME NATURALIST.

By Mrs. Emily J. Climenson.

THE terrible frost of January 17th (sixteen degrees registered) played great havoc with aquarium objects. The frost-crystals on the panes of the windows the ensuing morning were of the usual type, resembling vineyards, hop-gardens and bowers of fern-like tracery. On entering our stable I was astonished to see the frost-marking on the windows. A bold but exquisitely delineated pattern of acanthus-leaves was to be seen, drawn too accurately and beautifully for any human hand. The windows face due west, but are in an exposed situation, and the stable is very cold. I have never seen this frost-pattern before. I should say the acanthus-like leaves on the top measured from three to four inches across, then broke into a sort of stem, to be succeeded by another leaf or portion thereof, all precisely the same pattern. What struck me as singular was that all the heads of the so-called leaves bent from right to left, or southwards. January 18th was succeeded by three days of lesser degrees of freezing, but intensely cold wind. I had broken the ice at the top of the aquaria, and covered them with blankets, they being placed in a brick, octagonal summer-house here. Despite of this, my poor boatman *(Notonecta glauca)* died on January 19th, doubtless unable to breathe. I had kept a pair, which I had caught the third week in October, and placed in a glass jar to see how long I *could* keep them alive. One died soon, but the other flourished, and got quite tame, fastening on food at once when given. I also placed two *Ilybius ater* beetles in a jar, and two young efts, or water-newts, with branchiæ in another. After this frost the sole survivor is an eft, which, though lively, grows smaller apparently, yet the branchiæ are being absorbed. The poor fish mostly died, the only survivors being a gold-fish, two minnows, and two Prussian carp. The tails of the latter were injured from sticking to the ice. I placed them in a small aquarium, and took them into the house, where they rapidly revived, and continue well, and are now restored to the open air.

The wind, which blew so powerfully on January 22nd, took the snow as it fell and whirled it into a complete blizzard; the drifts were in some places near here fifteen feet deep, and many roads were completely blocked, and had to be dug out. To the snow succeeded rain, and the floods in the Thames valley rose rapidly, and continued from February 7th to the 12th to rise, only afterwards gradually sinking away, leaving the usual disagreeable smell of river mud.

Three winters ago, in severe weather, two rooks took to going to the school-house here. The schoolmaster and his family fed them with scraps. They learnt the hours of meals, and have ever since regularly appeared for pieces. The general number now are seven rooks, with the old pair. They come every day, summer or winter, and, I am told, seem to inflict no damage in the garden, with which our schoolmaster is particularly successful, and is devoted to its culture.

On February 12th Mr. C. Nicholson kindly, for the *third* time, essayed to send me specimens of

*Hydra viridis* and *Hydra vulgaris* in a small tube. This time they arrived quite safely, and the tube was emptied into a small glass jam-jar, with a little duckweed and *Anacharsis*. *Hydra viridis* is evidently the hardiest, as they are at the moment I write (March 5th) extremely flourishing, but *Hydra vulgaris* are evidently bad travellers, as they have from the beginning decreased much in numbers, and those I have present a frail appearance, quite unlike the *viridis*. One, however, of *H. vulgaris*, on February 25th, showed two circular brown spots in centre of body, which else was semi-transparent, and which I conclude must have been eggs. Unfortunately, the next day this *Hydra* had hidden itself. I have often witnessed generation by gemmation, but never by eggs. The Hydra are so like the rootlets of the duckweed it is sometimes a matter of difficulty to discern them. I am still inclined to think that they draw sustenance from the chlorophyll in the *Anacharsis*, or else poison it, as all the leaves they have been fastened on become brown and transparent, and I have four more glass jars in my drawing-room window with other creatures living amongst *Anacharsis*, the weed in which neither loses its colour nor is arrested in growth.

Vegetation is forward for this date. We have a number of Crown Imperials in a border here; they are only in leaf at present, but on sunny days smell just like the scent of a fox. This fact also applies to the flowers for the first day or two, and then wears off. Can this be to attract insects for fertilization?

At Shiplake, at a height of 308 feet above the sea, lies a terrace of plateau gravel drift; lower down, on the site of our house and church, stretching on either side, is another gravel terrace lying over the chalk, some 202 feet above the sea-level. In this gravel, in the year 1890, the first paleolithic implements, of a more or less oval form, were found. Since then a great many have been discovered at different times, and in the first week in February this year, on this lower terrace, Mr. F. O. Warner, who has made quite a small collection of worked stones here, found a remarkably fine specimen, which was picked off the surface of the ground of a field called Heath Hill. The actual size is 4½ inches by 3½ inches. One side is more highly polished than the other; two most cleverly chipped-out hollows are left on one side for grasping, fitting the thumb and middle finger very exactly. It is in brown chertstone. Besides flint and stone implements, some fine specimens of banded flint, chalcedonite or mammal flint, fossil sea-urchins, locally called "shepherds' crowns," a cast of an ammonite, fine specimens of flint sponges, and neolithic stone arrow-heads, give an interest to every pile of flints dug out or dredged, or scattered over the fields. So frequent are the flints and stones in this country that they are nicknamed "Oxfordshire weeds," and in some cases of high lands away from the river a too careful picking off of them is to be avoided, as in such a dry soil flints actually protect the moisture, caused by rain or dew, beneath them. In this county the uplands on the Chiltern range away from the river are particularly affected in dry seasons by water famine.

I have started a vivarium, and have a water-tortoise *(Emys orbicularis)*, a toad, two *Triton christatus* and some smaller *Triton punctatus* living in amity. It is curious how, whether winter or summer, high wind affects my tortoise, which I purchased last August. In a gale he is extraordinarily lively, and moves his head in an agitated way.

*Shiplake, Oxon., March 5th.*

## BOTANICAL TEACHING.

BEFORE the Royal Botanic Society of London, on February 27th, Mr. John Birkett, F.L.S., in the chair, a paper was read by Mr. Martindale, calling attention to the desirability of establishing in London an institution for the purpose of teaching botany. He suggested that such a botanical school should be similar to those in existence on the Continent, and proposed that the Council should take charge of the scheme and utilise a portion of their ground for the erection of the necessary buildings. From its central position and the fact of all the requisite material for study being at hand in a living condition, no other site in or near London would be so suitable for the purpose. The great fault of the present system of botanical teaching in England outside the medical schools and universities was that too much attention was given to botany solely with the object of enabling students to pass examinations, while economic and physiological botany was scarcely touched upon. If a young German was desirous of emigrating, previous to doing so he could attend a short course at one of the institutions at home, and learn all that would be of most use to him about the grasses, fruits and vegetable products of the country he proposed to settle in. In England there was no such means of acquiring knowledge of this kind, and it was for the purpose of supplying such a deficiency that the establishment of the institute was proposed. Among those present who gave the scheme their hearty support were Professor Oliver (of University College), Mr. D. H. Scott (of Kew), Professor Henslow, Professor Greenish, Mr. M. Carteighe, Mr. E. M. Holmes (of the Pharmaceutical Society), and many other eminent and scientific botanists. We feel sure that such an admirable proposal will not be allowed to drop, and hope those of our readers who can will use their influence in its favour.

## METEOROLOGICAL EXHIBITION.

THE Royal Meteorological Society recently held an important Exhibition of Meteorological Instruments in use in 1837 and 1897, in commemoration of the Diamond Jubilee of Her Majesty the Queen. It is only natural to expect that the space of sixty years should develop some remarkable improvements in this class of scientific instruments. That such improvements have taken place was very fully demonstrated by the collection we are now noticing. It was probably as complete as could have been got together. Still, when we consider the enormous strides which some other branches of science have made during the same sixty years, it seems remarkable how comparatively slow has been the progress of meteorology, taking into account its vast importance to the human race. We fully recognize the difficulties encountered by the meteorologists on every side, and the perpetual recurrence of the element of apparent accident brought about by conflicting influences from unexpected quarters. After examining the score and a-half exhibits representing the instruments in use when the Queen ascended the throne, and then looking over those of most recent construction, one cannot help feeling that in 1837 the general idea was nearly as far advanced as at the present time. The chief addition to the new instruments are for cloud observation, which is receiving greater attention now. This is probably to be attributed to the immensely advanced condition of the science of photography.

The exhibition was opened on Tuesday, March 16th, and held in the large library of the Institution of Civil Engineers, Great George Street, Westminster, S.W. The instruments which were in use in 1837, as might be supposed, were not very numerous, but many of them were somewhat quaint and of great interest. Sir E. H. Verney, Bart., showed an old barometer with a large spirit thermometer, which latter had an arbitrary scale, decreasing as the temperature increases, "extream cold" being 90° and "extream hot" 0°. A curious instrument of the olden time was shown by the Society itself, to whom it belongs. This was the large cistern barometer which was made by R. C. Woods in 1837 for the Meteorological Society of London. The proportion of the calibre of the tube to that of the cistern is as 1·50, a proportion which was considered sufficient to obviate the necessity of applying capacity corrections. The tube and cistern originally held 70 lbs. of mercury. Mr. G. J. Symons, F.R.S., exhibited an original centigrade thermometer by Gay Lussac.

The instruments in use in 1897 were very numerous, and comprised various forms of barometers, thermometers, hygrometers, rain-gauges, anemometers, nephoscopes, sunshine recorders, actinometers, aneroids, electrical and miscellaneous instruments. Many of the instruments were self-recording and were shown in action. The most interesting exhibit was a railed-off enclosure, about twelve feet square, covered with green baize, representing a typical climatological station of the Royal Meteorological Society. This included a Stevenson thermometer screen, fitted with dry bulb, wet bulb, maximum and minimum thermometers, rain-gauge, solar and terrestrial radiation thermometers, sunshine recorder and earth-thermometer, all of which were placed *in situ*. The exhibition also included a number of charts and photographs which were of great interest, particularly those, by Mr. J. Leadbeater, of ice-crystals on window-panes. These photographs were of great beauty, exhibiting some of the striking dendritic patterns assumed by ice-crystals. They appeared to develop definite types which, though frequently related, were remarkable for their divergence from each other. Mr. W. H. Dines showed an experiment illustrating the formation of the tornado-cloud, and Mr. Birt Acres exhibited some exceedingly interesting studies of form and movement of clouds and waves projected on the screen by his cinematoscope.

## ABNORMAL ORANGES.

SEVERAL correspondents have consulted us recently about an abnormal growth of orange fruit, said, in each instance, to come from California. Writing on March 2nd last, Mr. Eldon Pratt, of Northerndene, Streatham Common, near London, says, "We have recently had several fine oranges, said to be Californian; they are quite as large as the "Jaffa' fruit, and much the same shape, with thick peel. Each shows at its distal end, that farthest from the end of attachment, through a small aperture in the outer peel, bounded by thin edges, another smaller orange. On section it was evident that a complete immature orange was present, well developed, and about the size of a small tangerine. It was quite easy to entirely enucleate it, leaving a somewhat conical cavity. The "mother" orange was completely developed, very juicy, and in all cases, I think, pipless. Is this peculiar? At any rate, I thought it worth recording." Another correspondent sends, for our inspection, a couple of these supplementary fruit, which are much of the same character as those described by Mr. Eldon Pratt. He, however, draws our attention to a long cord-like connection between the small and the larger, or host-fruit, and suggests, we think properly, that they are probably placentæ connecting the two. Can any one tell our readers anything about this apparently frequent "sport" in Californian oranges?—[ED.]

## BOOKS TO READ

*A Monograph of the Land and Freshwater Mollusca of the British Isles.* By JOHN W. TAYLOR, F.L.S. Part iv., pp. 193 to 256; and figures 378 to 512. (Leeds: Taylor Bros., 1897.) Price 6s.

The fourth part of this fine work is occupied by the continuation of descriptions of the soft parts of the animals and their functions. It brings the subject well forward, and much skill is displayed in dealing with the organs under treatment. Consideration of the foot is completed and the pallium, or mantle, and the visceral region are discussed. On page 209, Mr. Taylor commences the description of the internal organization, beginning with the nervous system, which occupies fifteen pages. Following come the sensory organs, with admirable articles, well illustrated by drawings, on vision, smell, hearing and taste. The alimentary system is commenced but not quite completed in this part. We venture, with the author's permission, to quote a few lines and to re-produce illustrations to show the good style of this book. We have

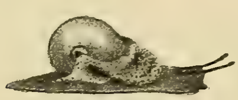


Fig. 398.

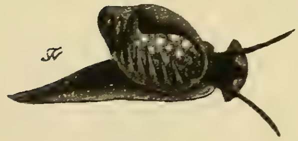


Fig. 399.

Fig. 400.

Fig. 401.

Figs. from Taylor's "Land and Freshwater Mollusca," illustrating the stages of the process leading to the degeneration and loss of the shell owing to its enclosure within the pallial lobes. Fig. 398—*Vitrina pellucida* × 1½, showing the first stages of pallial expansion. Fig. 399—*Physa fontinalis* × 2, illustrating a further advance of the process. Fig. 400—*Amphipeplea glutinosa*, in which the shell is almost entirely enveloped by the mantle. Fig. 401.—*Arion hortensis*, illustrating the complete infolding of the shell by the mantle and its consequent atrophy and loss.

selected for the purpose some of his remarks on the degeneration of the shell and its connection with the mantle. He says: "In *Vitrina* we have the first distinct stage in this process of the degeneration of the shell by its enclosure within the pallial folds, which project anteriorly in the form of an incipient limacoid shield, and laterally as a spatuliform lobe, both partially overspreading the external surface of the shell, which is evidently reduced in size as well as in substance, as the body of the animal is now only capable of being wholly contained within the shell during dry weather. . . . The genus *Arion* illustrates the disappearance of a definite shell, the anterior mantle or shield, as it is called, having assumed a very tough and leathery consistency, its margins completely overlapping and fusing together to form a sac enclosing the calcareous granulations which represent the vestigial shell."

It is in this manner that the author carries us on step by step through his work, making all things easy to the students of the terrestrial and fluviatile mollusca who desire to know these most interesting animals as they should be known. We again press upon our readers the advantage of supporting Mr. Taylor, by subscribing to his work, in his laudable effort to produce a really scientific monograph on one of the most popular and easily accessible classes available to the student of biology in the British Islands.

*New Thoughts on Current Subjects: Scientific, Social, Philosophical.* By Rev. J. A. DEWE. 230 pp. 8vo. (London: Elliot Stock, 1897). Price not stated.

This book consists of a series of essays on fifteen more or less abstruse subjects, which are divided into three sections of five each, viz.: Scientific, Social, Philosophical. So far as this magazine is concerned, the first and last sections alone appeal to us, though in our private capacity we find the second section amusing. The liberal and sweeping manner in which the author treats his subject is at times appalling. For instance, we may quote a sentence from his chapter on "Free Will *versus* Heredity," in which he says: "Let us turn to the converse side and contemplate the spectacle of a London child 'suckled on gin and born into eternal damnation,' that is to say, surrounded by every stimulant to evil; in almost every case the child grows up to a bad and wicked manhood or womanhood." If this is true, it seems to us that the author's vocation should be among benighted Londoners, rather than educating the youth of superior kind at Ilkley College. With regard to the Essays on Science and Philosophy, such subjects as "The Nature of Heat," "The Nature of Electricity," "Spiritualistic Communications," "The Dogmatic and Scientific Accounts of the Creation of Man," should be read and re-read to be understood. We have read and candidly confess we do not yet understand the theories propounded in some of them. There is frequently a want of care in expression. Writing of the abundance of life in the oceans, the author says, "The immensity of the fishing trade, the numbers that are able to gain a living by its means, are sufficient indications of the enormous quantities of fish, both moving and stationary." What, we venture to ask, are stationary fish? Certainly the author has done his best to include thoughts that are new into his book, but the reading of them is apt to raise thoughts in others which are unfortunately by no means new.

*The Hemiptera—Homoptera of the British Islands.* (Cicadina and Psyllina). By JAMES EDWARDS, F.E.S. 271 pp. 8vo, illustrated by 2 plates. (London: L. Reeve and Co., 1896.) Price 12s.

According to the custom of Messrs. Reeve and Co., in the series to which it belongs, this work is published in two forms; the smaller, we have received for notice. It consists of the letterpress portion of the larger edition, which is published with twenty-eight coloured plates, at 43s. net. In the book before us are two plain plates with outline drawings of anatomical characters of the insects under discussion. These will be found useful. It is unfortunate that, as in the case of the other books of this series, there is an absence of synonymic and bibliographical references, for nowadays synonomy is of such high consequence when clearly explained. The numbers of British species has been raised from 268—included in the Douglas and Scott Catalogue of 1876—to 307 in this work. Following a description of the general characters of the Homopterous sub-order of the Hemiptera are some useful remarks in the introduction upon collecting and preserving the specimens for study. Some of the former instructions are rather elaborate, though the author states that they are worth the trouble entailed in their prosecution. We have not seen the larger edition mentioned.

*Investigation into Applied Nature.* By WILLIAM WILSON, Junr. 143 pp. 8vo. (London: Simpkin, Marshall; Aberdeen: John Rae Smith.) No price given.

This is a series of collected and other papers by the author, bearing upon the economic relation between certain scientific studies and the application of their subjects to man's uses. For instance, "Our Indigenous Flora as Food Plants," "Pasture Plants," etc. There is some originality in several of these essays, both with regard to opinions and expression. Occasionally the scientific names of plants are confusing to the modern botanist, but doubtless the author knows what he means by *Pyroleæ vaccinieæ* or *Tussilago far'fara.* In writing about "Agricultural Zoology" the author says: "When we reach our third province, we immediately touch the province of insects; not only so, but it is noted for the immense variety of its forms, and it is only reasonable to suppose that agriculture has also immense interests involved in it. First we find the earthworm. . . . Next in order of structure we have the insects proper," and so on. We can hardly believe that Mr. Wilson desires to infer that earthworms are to be classed as insects; still, either through carelessness of expression or intention, he clearly does so. We fear that beyond causing gratification to the author, this work will add little to human progress.

*Insects affecting Domestic Animals.* By HERBERT OSBORN. 302 pp. large 8vo. Illustrated by 4 plates and 170 figures in the text. (Washington: U.S. Department of Agriculture, 1896.)

This admirable work is known as "Bulletin No, 5, New Series, U.S. Department of Agriculture, Division of Entomology," and forms one of the many valuable publications issued by the U.S. Government for the instruction of its citizens. It was originally intended to make this the joint work of the late Dr. C. V. Riley and Mr. Herbert Osborn, but the unfortunate death of Dr. Riley threw the responsibility upon the latter. The result is, as we have said, admirable. Without being too technical or prolix, the author takes us through the long series of pests which affect our domestic animals. Though written for the American public, the contents of this book will be found just as useful in Europe. Full particulars of each parasite are given with their life-histories, the hosts upon which they live, damage they effect, and the most modern and effectual remedies for the alleviation of their attacks. The illustrations, which are in most cases new and original, have been specially drawn or checked under the supervision of the author. Chapter ix. is a bibliography of the subject referring to the more important works on parasites, and will be found useful for reference. Altogether, this is a book to be used by all sorts and conditions of readers on both continents. The author is one in authority in his subject, being Professor of Zoology and Entomology at Iowa Agricultural College, and formerly Commissioner to inquire into these parasites. There is not any mention of price on the book, but our experience is that all works produced under these circumstances are extraordinarily inexpensive, and may be generally obtained through Messrs. Wesley and Son, Essex Street, London.

*Analytic Keys to the Genera and Species of North American Mosses.* By CHARLES REID BARNES. 221 pp. large 8vo. (Madison, Wis.: published by the University, 1897.) Price 1 dol.

This new work on the mosses of North America, by Professor Barnes, cannot fail to at once attain to the position of a standard for reference. It has been revised and extended by Mr. Fred de Forest Heald, and generally brought well up to date with the co-operation of many of the leading bryologists of America and Europe. The object of this large book is stated to be to fill up an interval before the new manual of North American mosses can be completed, and to further their critical study. It is really a third edition of a work first published with a similar object in 1886. All species known to be included in the moss-flora of that continent are included in the keys, which are followed by an "Appendix," occupying half the book, containing descriptions of species and varieties published since the issue of Lesquereux and James' "Manual of Mosses of North America." These are 603 in number.

*Liverpool Marine Biology Committee. Tenth Annual Report.* By W. A. HERDMAN, D.Sc., F.R.S. 52 pp. 8vo. (Liverpool: T. Dobb and Co., 1897.) Price 1s.

Professor Herdmann, as usual, produces an interesting report of the work done by the Committee over which he presides, and at the Port Erin Biological Station, where he directs. It was an eventful year in 1896 with the Committee, for it had to look its best on the visit of the British Association to Liverpool. The year is also memorable on account of the compilation of an index list of all the species of marine animals and plants recorded by the Committee during its first ten years' work. According to the Station Record, the tables at the Port Erin Laboratory were occupied on fifty-nine occasions by workers chiefly in connection with Owens College, Manchester, and University College Liverpool; though others came from such distant places as Christiania, Heidelberg, Geneva, Ierseke and Louvain. Professor Herdman recounts some amusing remarks passed by visitors when inspecting the contents of the tanks, such as the frequently expressed indignant exclamation, "but a fish is not an animal, is it?"—and that too from apparently educated persons. We quite sympathise with the Professor, for we need

not go to the Isle of Man to hear such exclamations. Included in this report is an interesting list of the sea anemones of Port Erin, which number twenty-one species. The Committee had a nice windfall last year by the vote of £950, the unspent balance of the local fund collected at Liverpool for the entertainment of the British Association. Both the Local Committee of the British Association and the Marine Biology Comm:..ce are to be congratulated on the happy event.

*Leicester Literary and Philosophical Society Transactions.* 61 pp. 8vo. (Leicester: Geo. Gibbons and Co., 1897.) Price 6d.

The part of the Leicester Transactions before us is No. 7 of volume iv. of the new quarterly series. The meetings reported extend from October 5th to December 14th, 1896. The first was occupied by the "President's Address," which was evidently prepared with much care, though there is nothing to indicate the name to whom praise is due. Its subject was "The Cultivation of the Powers of Observation." There are several papers of interest among the others. One by Mr. Frank Bouskell, F.E.S., upon "The Disappearance of Certain Species of Insects, with Notes on their Slaughter and Protection." Some of the statements contained in the paper are doubtless true, but others need confirmation, especially one about the late Dr. Power and the brown paper. That over-collecting may, in some instances, do damage, there is no reason to discuss; but that it is the cause of the disappearance of various insects from our fauna, is simply impossible. There are literally thousands of square acres of splendid collecting-ground in the British Islands, where the net of a collector has never yet been seen. Still the "disappeared" butterflies are not there now, though doubtless common at one time. We must look for other cause than the "collector" for the partial extermination of the black-veined white butterfly in Britain. What is there visibly different in our islands from other countries where the Camberwell-beauty butterfly (*Vanessa antiopa*) breeds commonly every year? Most seasons it is recorded as occurring in Britain, but is there any authentic record of the larvæ having ever been found here? If ever an insect was over-collected and that for the past fifty years, it was *Epione paralellaria* (*vespertaria*) in its most restricted area, near York. If the collecting theory was correct, that species ought to have disappeared years ago. The Leicester Society has passed certain regulations for the protection of rare and local insects in the neighbourhood. To these rules a schedule is attached giving the limit of number to be taken by any one member, apparently in any season. We doubt, however, the practicability of the scheme, though planned with such good intention.

*Természetrajzi Fuzetck.* Vol. xx., 1897. Parts 1-2. 308 pp. 4to. Illustrated by 6 plates and frontispiece. (Budapest National Museum, 1897.)

This handsome publication is edited by the staff of the National Museum at Budapest, being beautifully illustrated and well produced. It is a journal devoted to the natural sciences, and is conducted under the auspices of the Hungarian Academy of Sciences, from which the management receives a subvention. The subscription is only 10 francs per annum. The number before us commences with an appreciative article by Dr. Harváth Géza upon Trivaldszky János, illustrated by a portrait of this celebrated naturalist, whose work was in entomology and other branches of the invertebratæ.

# BOTANY

Abnormal Hazel-Flower.—I have found a remarkable deviation from the ordinary form of female flower of *Conylus avellana*, in which it appears as a complete whorl or coronet round the bud, instead of the usual tuft. This is the only instance I have met with, though I must have examined many hundreds of these flowers from time to time. The appearance of the flower is unusually striking and abnormal.—*H. M. Dixon, Wickham House, East Park Parade, Northampton; February 23rd*, 1897.

British Grasses.—We understand that the Rev. E. Adrian Woodruffe-Peacock, of Cadney, Brigg, has undertaken to edit a new edition of Mr. Lowe's "British Grasses." It would greatly assist him if botanists, who have specimens of the following grasses in their collections, would lend, or present them to him for comparison. It would be well to first communicate with Mr. Peacock, who undertakes to carefully return all specimens lent. The species required are:—*Setaria glauca*, Beauv.; *Apera interrupta*, Beauv.; *Spartina townsendi*, H. and J. Groves; *Homalocenchus oryzoides*, Mieg.; *Phalaris paradoxa*, L.; *Anthoxanthum puelii*, Lecoq.; *Deyeuxia strigosa*, Kunth.; *Ammophila baltica*, Link.; *Deschampsia discolor*, Roem. et Schultz.; *Briza maxima*, L.; *Poa stricta*, Lindb.; *Poa laxa*, Hœnke; *Poa glanca*, L.; *Poa balfouri*, Parnell; *Poa chaixii*, Vill.; *Poa palustris*, L.; *Festuca ambigua*, Le Gall; *Festuca myuros*, L.; *Festuca dumetorum*, L.; *F. heterophylla*, Lam.; *Bromius tectorum*, L.; *B. Racemosus*, L.; *Lolium linicola*, Souder; *Agropyron pungens*, Roem et Schultz; *A. Acutum*, Roem. et Schultz. It is fortunate so good a botanist has been selected to re-edit this book.

Economic Use for Heracleum.—If your correspondent, Mr. W. E. Nicholson, will refer to Loudon's Encyclopædia of Plants, edition edited by Mrs. Loudon, footnote, pp. 222 and 223, he will find some information about the drying of the leaves, etc., of the *Heracleum gigantium*, which he mentions (*ante* p. 266), which may be sufficient to afford a basis for further inquiry if he desires it.—*J. W. Jeans, M.R.C.S.Lond., Grantham.* [The note refers to *H. sphondylium*, the common "cow-parsnip," and is as follows: "Gmelin informs us that the inhabitants of Kamtchatka, about the beginning of July, collect the footstalks of the radical leaves, and after pulling off the rind, which is very acrid, dry them separately in the sun, and then, tying them in bundles, lay them up carefully in the shade in bags; in this state they are covered with yellow saccharine efflorescence tasting like liquorice; this, being shaken off, is eaten as a great delicacy. From the stalks thus prepared and fermented with bilberries, the Russians distil an ardent spirit which, Gmelin says, is more agreeable to the taste than spirits made from corn. A kind of ale is brewed from the leaves and seeds in Poland and Lithuania. Rabbits and swine are fond of the leaves, but not horses."]


CONDUCTED BY FRANK C. DENNETT.

| | April. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 7 | 5.23 a.m. | 6.41 p.m. | 1.6 | 7° 2′ N. |
| | 17 | 5.1 | 6.57 | 1.43 | 10° 40′ |
| | 27 | 4.41 | 7.14 | 2.20 | 14° 0′ |
| | | Rises. | Souths. | Sets. | |
| *Moon* | 7 | 7.9 a.m. | 4.2 p.m. | 0.0 a.m. | |
| | 17 | 8.4 p.m. | 12.34 | 4.29 | |
| | 27 | 2.59 a.m. | 8.48 a.m. | 2.52 p.m. | |

| | | Souths. h. m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 7 | 0.24 p.m. | 2″ 6 | 1.28 | 9° 6′ N. |
| | 17 | 0.59 | 3″ 0 | 2.42 | 17° 30′ |
| | 27 | 1.17 | 3″ 8 | 3.40 | 22° 20′ |
| *Venus* | 7 | 1.45 | 24″ 1 | 2 50 | 23° 17′ N. |
| | 17 | 0.57 | 27″ 6 | 2.41 | 22° 37′ |
| | 27 | 11.58 a.m. | 29″ 3 | 2.21 | 19° 47′ |
| *Mars* | 7 | 5.31 p.m. | 3″ 1 | 6.35 | 25° 15′ N. |
| | 17 | 5.14 | 2″ 9 | 6.58 | 24° 43′ |
| | 27 | 4.58 | 2″ 8 | 7.21 | 23° 59′ |
| *Jupiter* | 17 | 8.27 | 19″ 0 | 10.12 | 12° 33′ N |
| *Saturn* | 17 | 2.10 a.m. | 8″ 5 | 15.52 | 17° 52′ S. |
| *Uranus* | 17 | 2.2 | 1″ 9 | 15.44 | 19° 33′ S. |
| *Neptune* | 7 | 4.3 p.m. | 1″ 2 | 5.8 | 21° 33′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | April 2 | 4.24 a.m. | *1st Qr.* | April 10 | 8.27 a.m. |
| *Full* | ,, 17 | 6.25 a.m. | *3rd Qr.* | ,, 23 | 9.48 p.m. |

SUN.—Spots of considerable size continue to appear on the disc. During February and the early days of March much of interest showed itself both in actual change of appearance in the spots themselves and in real motion on the sun's disc.

MERCURY is in superior conjunction with the sun at 3 a.m. on April 2nd, but from about the 23rd to the end of the month is well placed for observation, setting more than two hours after the sun. He will be found very near the Pleiades, the cluster of bright stars in Taurus, about 1° south on the 27th, on which night he sets about 9.25. He shines with a brilliant, rosy light. He reaches greatest elongation east, 20° 33′, on April 28th.

VENUS is visible early in the month, but at 7 p.m. on the 28th is in inferior conjunction with the sun. She is situated between $\alpha$ Arietis and the Pleiades all the month; her appearance is that of a crescent, growing narrower every day. To observers using an equatorial she may possibly be observed close to conjunction, a few degrees north of the sun.

MARS is a tiny object, only observable with fairly large telescopes. He is in the constellation Gemini. At the beginning of the month he forms a triangle with the third-magnitude stars $\mu$ and $\epsilon$ Geminorum, and at the end he lies to the south-west of Pollux.

JUPITER is in Leo, between Regulus and $\rho$ Leonis on the 1st, and gradually retrograding towards the former. He sets at 4.45 a.m. on April 1st, and at 2.49 a.m. on April 30th, so is visible all the evening hours, in good position.

SATURN rises about 10.44 p.m. on the 1st, and at 8.41 on the evening of the 30th. Were it not for his great south declination he would be a magnificent object. On the 15th the outer major axis of the outer ring is 42″·35, and the outer minor axis 17″·47, whilst the angular diameter of the planet is 16″·8, so that the rings extend beyond the poles. It is situate west-north-west of $\beta$ Scorpia.

METEORS should be looked for on April 11th, 12th, 19th, and 20th.

VARIABLE STARS visible during April are:—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| S Virginis | 13.26 | 6° 31′ S. | 6·0 | 11·0 | 373·6 days. |
| $\alpha$ Boötis (Arcturus) | 14.10 | 19° 49′ N. | 1·0 | | * |
| LL. 26325 Boötis | 14.18 | 8° 38′ N. | 6·5 | 8·5 | † |

THE ROTATION PERIOD OF JUPITER.—The most recent determination is by Herr A. A. Nyland, who, from observations on some of the markings, gives a period rather exceeding 9h. 55m. 30s., which is the period found by Beer and Mädler. The late Sir G. B. Airy, in 1834, made it 9h. 55m. 21s., whilst Professor Schmidt, in 1866, gave as a mean 9h. 55m. 46·3s. To obtain the exact rotation may *appear* easy to those unacquainted with close Jovian observation, but, as a fact, is practically an impossibility, because different objects give different periods. In 1880 Mr. H. Pratt gave 9h. 55m. 33·9s. as the period determined by observations on the great red spot. Mr. W. F. Denning, observing bright spots in the Equatorial Zone, found a period of 9h. 50m. 5s., whilst from dark spots in the north Temperate Zone the same observer found the period was only a little over 9h. 48m. So that at the same time three classes of objects were giving three different rotation periods, differing to the extent of more than seven minutes of time.

BRILLIANT METEOR.—Mr. S. H. R. Salmon, M.B.A.A., of South Croydon, writes to the "English Mechanic": "On February 20th, 6h. 3m. 30s. p.m., I was admiring Venus in strong twilight, and turned eastward to see if Jupiter was yet visible, when an exceptionally splendid meteor fell from Gemini toward the head of Leo Major. It seemed to originate near Castor, and was quite equal to Venus in lustre, although not so white. When, in its fall, it was about equidistant from Castor and the horizon, it divided, the following portion being fainter, and having a reddish tinge. Then all quickly vanished, without any report that I could detect." Is this the same meteor that was observed at Dover the same evening? Did any of our friends see it?

JUPITER'S SATELLITES.—In 1877–81 the writer made 424 observations of the relative brilliance of these little bodies, finding as a result that it could be represented thus: III: I, II; IV. I, was usually brightest in that half of its orbit nearest the earth, especially when east of Jupiter. II; was brightest to the east of Jupiter, especially in the quadrant of its orbit nearest the earth. III: was brightest in the eastern half of its orbit, especially that part farthest from the earth, whilst it was faintest in the portion corresponding on the west of the planet. IV. was brightest in west superior and east inferior quadrants, and faintest in west inferior. II; was the most constant in brilliance, whilst IV. was the most variable. It almost seemed as if, like our own moon, they always presented the same face to the planet, but, unlike our own satellite, had atmospheres with considerable changes in meteorological condition.

* Variable in colour, yellow to yellowish red.
† Variable in colour, yellowish white to reddish.

# SCIENCE GOSSIP

AMONG the recently elected members of the Geological Society of France was Mdlle. Marie Loyez, Professor of Natural Sciences, Paris.

MR. ERNEST SWINHOE, Avenue House, Oxford, has sent us his sixth (1897) Catalogue of Exotic Butterflies and Moths, with prices of the specimens.

A MEETING of the International Congress of Zoology will be held at Cambridge, commencing on August 23rd, 1898. Sir William Flower will be the President.

SOME of our readers may be glad to know that there exists at 1, Stamford Road, Singapore, Straits Settlements, an agency for the supply of natural science objects. The proprietor has favoured us with one of his circulars.

MESSRS. R. AND J. BECK, of 68, Cornhill, London, have issued a new catalogue of Petrological and Metallurgical Microscopes, at popular prices. It contains at least three new models, which should be of value to students of rocks and ores.

M. G. BUCHET, who is in charge of the mission at Santa Cruz de la Palma (Canary Islands), is preparing a work upon the greater fish of the Western Coast of Africa. He will be glad to receive any zoological or other notes bearing on the subject.

AN important paper on "The Land Mollusca of County Antrim," by Mr. Robert Standen, which appeared in the January "Irish Naturalist," has been reprinted and issued in pamphlet form by the author.

THE Annual Report of the Society for the Protection of Birds for 1896, states that the members and associates reach nearly 18,000 in number. The excellent work done by this Society is well known. The Hon. Secretary is Mrs. Lemon, Hillcrest, Redhill, Surrey.

A LEAF-MINING Pyralid in the habit of feeding in the larval state is a novelty of this large group of moths. It is named *Titanio helianthiales*, and described in the "Canadian Entomologist" for March, by Mary E. Murtfeldt, of Kirkwood, Mo. It is said to be a true leaf-miner and works between the cuticles of *Helianthus*.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY propose to hold a Conversazione and Exhibition of Natural History Objects on Tuesday evening, April 27th, at the Library of the London Institute, Finsbury Circus. Many well-known London naturalists, especially entomologists, have promised to exhibit. Musical selections and light refreshments will be given during the evening. The admission will be by ticket, two shillings each, which may be obtained from the Acting Secretary, Mr. H. A. Sauzé, 4, Mount Villas, Sydenham Hill Road, S.E.

AZECA ELONGATA, a supposed addition to the land-shells of Great Britain, is figured and described as a new species, by Mr. John W. Taylor, F.L.S., in the "Yorkshire Naturalist" for March last.

THE Journal of the Essex Technical Laboratories for February contains a well-written article upon "Sulphur in its relation to Crops." There are also other articles which, though popularly written, are thoroughly scientific in character. The Journal is issued under the auspices of the Essex County Council, at the Laboratories, Chelmsford, and is only priced threepence.

MESSRS. FRIEDLANDER AND SON, of Berlin, have sent us "Natural Novitates" and their catalogue of botanical works (Cryptogamae) just issued. The latter contains forty pages of closely-printed titles of works. Other cataloges are issued by this firm on Fungi, Lichens, Algae, Characeae, Desmidieae and Diatomeae. Most of these subjects also occur among the titles in the catalogue before us.

WE observe that the Hull Scientific and Field Naturalists' Club has commenced a cuttings book for insertion of nature notes of a local character. It is suggested that these should be discussed at the meetings before being entered. This is wise, for we have a fine collection of newspaper natural history, chiefly of an unconsciously humorous character. If one desires abundant inaccuracy, it will be found in newspaper cuttings on science subjects.

WE have received a "Supplementary List of the Bryozoa of the Chatham Chalk," by Mr. W. Gamble, of Chatham. The first list published by Mr. Gamble was issued in 1892, and contained 125 species and varieties. This second list, compiled last year, adds seventy-five species and varieties. As there does not appear to be any properly arranged collection of fossil polyzoa in this country, these lists cannot fail to be useful in indicating what may be expected from the chalk of the Chatham district, which has been diligently worked by Mr. Gamble for some years past.

LANCASHIRE has recently lost two of its leading entomologists, both of whom will be sadly missed, having been authorities for the past forty years. Following the death of Joseph Chappell, of Manchester, which occurred on October 3rd last, has come that of J. B. Hodgkinson, late of Preston. Both these men were excellent practical entomologists, whose repute had extended to all parts of the world where English entomology is studied. Mr. Hodgkinson died in February last. Mr. Chappell was sixty-seven, and Mr. Hodgkinson seventy-four years old.

THE illustrated supplement of the Paris *Petit Journal*, which newspaper is believed to have the largest circulation in the world, has latterly given much attention to popular natural history. This has taken the form of full-page coloured illustrations of "good and bad" fungi, otherwise poisonous and edible; "Birds useful to man," is an important series of portraits of wild native birds to be preserved in France; "Venomous and Harmless Reptiles of France" is another series, and at present the poisonous plants of Western Europe are being illustrated. Such a series would do much good in Britain if produced at the same price, viz., one halfpenny per number, and as effectively coloured.

# SCIENCE ABROAD

CONTRIBUTED BY FLORA WINSTONE.

La Naturaleza (Madrid, Nos. 1 to 7, vol. viii., from January 8th to March 8th, 1897.) January 8th contains an article on the new Equatorial Telescope, made in Berlin, for the Observatory of Grunewald, with illustration. The report of the Congress on the Anthropology of Criminality is concluded, giving papers on this subject, of Herr van Hamel, Dimitri Drill and Professor Lombroso. Dr. Francisco Vidal y Careta continues his notes on the "Races of Men who have successively inhabited Cuba," and there is a further article on "The Study of the Movements and Revolutions of Planets," by Don Manuel G. Vidal.—The number for January 18th has a series of lengthy notes on "The Cultivation of Vines," by Don Ricardo Becerro de Bengoa, the Director of the magazine; Dr. F. Vidal y Careta and Don M. G. Vidal continue their articles above mentioned. February 8th contains an article on "The Perils of Acetylene," by an anonymous writer, also the continuation of "The Problem of Longtitude at Sea," by Don J. de Irrea.—February 18th. Don R. Becerro de Bengoa gives an account of the creation, foundation and proposed work of the Institution of Experimental Hygiene at Montevideo. The Council of Instruction at Montevideo formulated in 1894 the project of such an institution, and it was decided that it should be founded on the same lines as the Laboratory of Bacteriology of the Faculty of Medicine. The list of subjects is very extensive. M. M. G. Demény contributes an illustrated article on "Cinematography, or, as it is expressed in the article, "Photographature of Movement." Drawings are given of the camera used by the author, and also of special appliances which render photographs of movement possible.—February 28th. Don R. Becerro de Bengoa contributes an article, with analyses, on "The Combination of Argon and Helium." An anonymous author writes on "The Industrial Uses of Acetylene," and Don M. Gomez Vidal continues his series on "The Study of the Movements and Revolutions of Planets."—The part for March 8th contains an article on "Agriculture in England," and another on "The Mines of the Transvaal," by Don R. Becerro de Bengoa. A note on "A War Automobile" gives an illustration of a new auto-motor car, with guns mounted in front and at the back, sighting both ways.

La Feuille des Jeunes Naturalistes (Paris: February, 1897). M. Adrien Dolfus has an illustrated article entitled "Iconographic Table of the Philosciæ of Europe," a family of terrestrial crustacea or woodlice. He describes shortly but clearly the characters of the genus *Philoscia*, and especially those which distinguish them from the genus *Oniscus* and the genus *Porcellioniens*. M. Dolfus states that it requires a practised eye to tell at the first glance, *Philoscia* from *Ligidium*, but the much articulated "scourge" in the last genus is a character which distinguishes it. M. G. de Lapouge contributes a valuable paper on "The Phylogeny of Carabus." He states that Coleoptera are very unequal in their phylogenic evolution, but the group Carabus is, in general, advanced in its evolution; certain sections showing remarkable differences. The difference in each genus in the present day, and as represented on sculptures and other archæological records, is given in detail, and also, in some instances, the probable causes of the evolution of certain organs. In the next number of this magazine, M. Eug. Simon will commence his "Synonymous Catalogue of the Trochilides": M. Et. Rebaud will contribute papers on the work recently done in "Cellular Division," and the series of articles on "Salt-water Molluscs" will be continued.

Bulletin de la Société Zoologique de France (Paris, 1897), contains the new statutes of the Zoological Society of France, which was founded June 8th, 1876, and incorporated December 16th, 1896, by a decree of the Government. There is also a list of the members, honorary, corresponding and ordinary. The addresses of the retiring President, M. E. L. Bouvier, and of M. R. Moniez, President for 1897, are fully reported. M. Ernest Andree contributes a "Description of three new species of Mutilla from Eastern Africa belonging to the Royal Museum of Belgium." These three new species, which have been recently acquired by the Natural History Museum in Brussels, are *Mutilla anguliceps* (a single specimen was found in Delagoa Bay); *M. trungativentris* (one specimen was found in Delagoa Bay and another exactly similar, labelled Africa, was sent to the Museum at Naples), and *M. delagoensis* (from Delagoa Bay, one specimen; another, also labelled Africa, is in the Naples Museum). M. Ph. Dautzenberg and M. H. Fischer give an "Account of the New Species of *Pelecypodes*," found during the voyages of H.S.H. Prince Albert of Monaco. The same authors describe the "New Species of Gastropods" obtained on these expeditions. M. Dautzenberg, in conjunction with M. E. de Boury, further gives an account of the "New Species belonging to the genera Scalaria and Mathilda" found the same time.

Proceedings of the Association of Economic Entomologists.—The U. S. Department of Agriculture has issued a report of the eighth annual meeting of this association, which was held at Buffalo, N. Y., August 21st and 22nd, 1896, when the average attendance was about thirty persons interested in this subject. Mr. C. H. Fernald, of Amherst, Mass., the President, gave an important address, entitled "The Evolution of Economic Entomology." He commenced by referring to the earliest accounts of injuries caused by insects, which appear to be those mentioned in the Old Testament and the earlier Greek and Latin authors. Passing thence to the year 875 A.D., the President referred to Berg's "History of the German Forests," which gives an account of the devastation caused by grasshoppers in the Rhine valley. No efforts appear to have been made to check these ravages other than by processions of priests carrying holy relics around the infested fields. Later insect plagues were discussed, and the earlier means employed to arrest their damage. Commencing with the newer and more intelligent economic entomology, which may be said to have grown with the present century—very slowly during the first half—the President concluded with a valuable statement of its present condition and a forecast of work to be done in the future.


Argynnis Adippe var. chlorodippe. — The insects which I mentioned having taken in the New Forest last summer, under the impression that they were *Argynnis niobe* (*ante* p. 138), have since been proved to be the variety *chlorodippe* of *Argynnis adippe*. Both were taken on August 1st, 1896, between Lyndhurst and Brocklehurst. — *Catherine A. Winckworth.*

Early Nesting of Thrush.—A thrush commenced building its nest in a yew-tree in my garden on February 27th. The nest was very soon completed, and the first egg was laid on March 7th. This is earlier than these birds generally commence nesting with us, but the weather has been mild since the beginning of February.—*Edward Ransom, Sudbury, Suffolk; March*, 1897.

A Swallow in February.—On February 13th, a swallow was seen in this village, but has since disappeared. It was first noticed settled on the roof of a stable, and gave its observer the opportunity of watching it for some time. As it could scarcely be an immigrant at so early a date, it was probably a late-hatched specimen which had failed to migrate. The specimen has been observed several times since.—*C. A. Briggs, Rock House, Lynmouth, North Devon*; *March*, 1897.

The Value of Specimens.—The Reginald Cholmondeley collection of shells was sold by auction on March 15th. It contained many fine specimens of *Murex*, *Voluta*, *Conus*, *Pecten*, and *Spondylus*. A choice *Murex monodon* fetched £3; a very good specimen of *Cypræa aurantia*, £2 15s.; a *Conus crocatus*, £1 1s.; a *Conus omaicus*, £2 5s.; a *Conus rhododendron*, £1 1s. A *Pecten reevei* sold for £1 1s. Among the genus *Voluta*, *V. aulica* fetched £6 6s.; *V. lyræformis*, £4; *V. junonia*, £1 5s.; *V. pulchra*, £1 10s. *Cyclostoma formosum* and *C. deburghiæ* together sold for £2 2s.

Age of Yew-trees.—It is seldom that we have the opportunity of fixing the age of yew-trees, and, therefore, it is interesting to note that at Hurstbourne Tarrant, near Andover, are two in the churchyard, which are quite in their prime, the time of whose planting is recorded in the parish register. Writing to "Notes and Queries" some time ago, Mr. W. P. W. Phillimore, of London, says, "The older of the two is on the western side of the churchyard, and is 8 feet 4 inches in circumference at the base, but diminishes to 6 feet 8 inches at the height of five feet. The one is aged a little over two hundred years, as shown by the following entry: 'The eutree next to ye vicar's garden, planted by Sam. Heskins (vicar) in ye year 1693.' The other, situated on the south side of the churchyard, measures in circumference 7 feet 2 inches both at the base and five feet higher up. This is a century and a-half old, as appears from the register: 'Memorandum, October the 10th, 1741. There was an yew-tree planted in the churchyard pretty near the outward rails, by the order and at the expense of the parish.'"—*Benj. Winstone, Epping.*

Marine Zoology of Cromer.—As I am thinking of visiting Cromer this spring, will anyone kindly inform me, through the columns of Science-Gossip, if that district is a good collecting-ground for marine objects, such as Crustaceans, Echinoderms, etc.? I take a great interest in marine fauna, and wish, if possible, to go to a place where I can add to my collection, but shall not be able to go farther afield than Cromer. Would it be any use dredging with a small naturalist's dredge off the coast, or is it too sandy? I should also be obliged if referred to any book on the marine zoology of Cromer district.—*H. W. Parritt, 8, Whitehall Park, Archway Road, London, N.*

Tinted Shadows.—I always thought shadows were all much of a colour, indeed, shades of the same colour according to the power of the light producing them. The other night, when reading, two incandescent burners being alight, I noticed on my book a double shadow of my hand and cigar-holder, one being pale pink and the other pale green. The lights were shaded, one with a globe of scarcely perceptible pink tint, the other with a similar globe, but with a ruby chimney. On turning out either of these, the shadow from the other was of the ordinary colour, but upon turning it up again, the two shadows reappeared, one pink, the other green, as before. Can this be explained?—*E. M. Stone, Cumnor, Sydenham; 9th January*, 1897.

Larva of Common Eel.—The embryo condition of the common eel has long puzzled embryologists. Some time ago we drew attention in these pages to its discovery by the Italian naturalists, Grassi and Calandruccio. They found the larval condition of eels to be identical with a well-known marine form, *Leptocephalus*. That was in 1892, though it had already been suggested these animals were probably a larval form of some fish, by an American, as early as 1864. In "Nature," for March 18th last, Mr. J. T. Cunningham figured these early stages, and contributes some valuable notes upon their history. It is curious that the sun-fish appear to feed largely on the young eels. This fact seems to prove that both they and the eels are species living at great depths, as neither are often seen at the surface of the sea. When the eel-fry enter the rivers they are about one year old. The ova are deposited by the parent eels in the sea, and they migrate from the fresh-water for this purpose.

Derivation of "Cleat."—With regard to the derivation of "Cleat" Hill (*ante* pp. 165 and 225), it is not unlikely it may have got the name from the smooth face or escarpment to the Oxford clay there. In the North of England coalfields, the large smooth vertical surfaces of the coal are known by the names of the "face," the "slyne," or the "cleat" (*vide* Jukes and Geikie, "Manual of Geology," p. 179). At Cleat Hill, Bedford, the Oxford clay is worked for brick-making from the edge of the flat up the hill slope until it meets the cap of boulder clay above, so that the whole face of the hill—the cleat hill—is laid bare. Of course—at least I suppose that the word "cleat" was applied to this hill anterior to the time of the brick-making operations carried on there. On referring to the six-inch Ordnance map I see the words "Cleat Hill" are engraved close to, and parallel with, the steepest bit of the road that runs up over the escarpment. Although there is a place on the top of the hill called Cleat Hill Farm, the map

shows it is only the steep bit of road that is known as Cleat Hill. The other side of the road is Mowsbury Hill, where, I believe, there was once a castle.—*A. C. G. Cameron, H.M. Geological Survey*, 158, *Foster Hill Road, Bedford; February*, 1897.

REPRODUCTION OF LOST LIMBS IN BIRDS.—In connection with a query as to the above, appearing in SCIENCE-GOSSIP (*ante* p. 225), the following curious circumstance has come under my notice: Mrs. Newcomb, of the Holly Bush Inn, Loughton, Essex, had, early in 1895, a tame magpie, and also kept, amongst other pets, several canaries. One day this magpie seized one of the canaries by the leg, through the bars of its cage, and succeeded in wrenching the leg off by breaking it between the tibia and canon-bone. At this moment the canary was rescued, and, although very much exhausted, survived, perching on one leg. It was noticed, however, some little time afterwards that the stump of the damaged leg was apparently growing a sort of pear-shaped bag or bladder, and this continued for about six or seven months, when one morning it split open, and disclosed two claws at first; the next day, however, the complete leg appeared, and the bird picked off the now dried-up skin cover. It was a week or two longer before the leg was used constantly, the bird only using it for a few moments at a time until then, and drawing it up under its wing in the intervals. Afterwards the new leg became to all intents and purposes the same in appearance, and quite as strong as the uninjured member. I understand the canary was a young bird, and there are plenty of reliable witnesses resident in Loughton who can confirm the particulars supplied to me by the lady who kept the bird.—*F. W. Halfpenny*, 125, *Godwin Road, Forest Gate*.

LEPIDOPTERA IN NEW FOREST.—A fortnight's stay in the New Forest, in the neighbourhood of Lyndhurst, last August, resulted in various additions to our insect collection, though the weather, on the whole, was unfavourable. We were a little late for *Argynnis paphia* (silver-washed fritillaries), specimens of which, though still abundant and looking lovely on the wing, were as a rule very damaged. We also took the variety *valesina*, though not in very good condition. On the heaths fine specimens of *Satyrus semele* (grayling butterfly) were exceedingly common, their short, rapid flights and frequent settling giving a characteristic effect. We took a variety of the female in which black spots on the fore-wing were not white-pupilled and the black spot on the hind-wing was absent. The specimens of *Pieris napi* (green-veined white butterfly) in this neighbourhood were well marked, but unusually small. A *P. rapæ* (small white butterfly) was obtained, with the usual dull yellow of the underwings a brilliant brimstone tint. Heaths, arguses, brimstones, blues and other butterflies were abundant, and we several times saw *Apatura iris* (purple emperor butterfly) circling round the tops of the trees. The moths which came most freely to sugar were *Amphipyra pyramidea* (copper underwing), *Catocala promissa* and *C. sponsa* (dark and light crimson underwings). The copper underwings were a perfect nuisance, while the yellow underwings were of tolerably rare occurrence. *Hydræcia nictitans* (ear-moth) was the only other species that was at all abundant. Our remaining captures were nearly all of single specimens, including *Agrotis puta*, *Thyatira batis*, *Cerigo cytherea*, *Noctua rhomboidea*, etc.—*Catherine A. Winckworth*, 11, *Old Steine, Brighton; March 15th*, 1897.

## TRANSACTIONS

ROYAL METEOROLOGICAL SOCIETY. — At the Meeting held on February 17th, Mr. Edward Mawley, F.R.H.S., President, read a Report on the Phenological Observations during the past year. He showed that throughout the flowering season wild plants came into bloom much in advance of their usual time, and were, as a rule, earlier than in any recent year since 1893. The wealth of blossom on nearly all kinds of trees and shrubs was a noteworthy feature of the spring and early summer, while the abundance of wild fruits in the autumn was even more exceptional. From an agricultural and horticultural point of view the one great drawback of the year, which must otherwise have proved one of the most bountiful on record, was a drought that lasted almost without break—at all events as far as vegetation is concerned—from March to September. The wheat crop proved the largest and best for many years, while there was a good yield of barley and potatoes. The small fruits were also good. With these exceptions all the farm and garden crops were more or less indifferent, the crop of hay being especially scanty. The Hon. Rollo Russell gave the results of some observations on "Haze and Transparency," which he had made at Haslemere, in Surrey. From these it appears that the clearest hours at a good distance from towns are from about noon to 3 p.m. The clearest winds are those from south to north-west inclusive, and especially west-south-west, west and west-north-west; the haziest are those between north and east. On bright mornings with a gentle breeze or calm, from autumn to spring, the haze or fog which has lain on the low ground, frequently covers the hills in the course of its ascent a few hours after sunrise. At any distance within a hundred miles of London or of the Black Country observations requiring clear views are likely to be interfered with when the wind blows from their direction, and should be taken early. In connection with the Society's special exhibition of instruments (*vide ante* p. 307), which was arranged at the Institution of Civil Engineers, in commemoration of the Diamond Jubilee of H.M. the Queen, a lecture was delivered on March 17th, by Mr. G. J. Symons, F.R.S., on "Meteorological Observations in 1837 and 1897." After describing some of the instruments in use at the commencement of the Queen's reign, the lecturer stated that he had collected all the known records of rainfall for the year 1837, and that he was able to give the total rainfall for that year from 161 stations. An account was then given of the meteorological instruments in use at the present day, reference being made to the barometer, thermometer, hygrometer, rain gauges, anemometers, self-recording instruments, etc. The methods adopted for registering the duration of sunshine and the amount of evaporation were next described. Allusion was also made to the help which photography has rendered to meteorology, especially in relation to the forms and movement of clouds, etc. Mr. Symons concluded his lecture by exhibiting a map showing the state of the

weather over Western Europe at 8 a.m. the same morning of the lecture, which throughout was illustrated by numerous lantern-slides. Mr. Birt Acres showed on the screen, by means of his cinematoscope, some very interesting studies of clouds, and also of waves at Dover during the storm on March 3rd last.

NORFOLK AND NORWICH NATURALISTS' SOCIETY. —At the meeting of the Norfolk and Norwich Naturalists' Society which was held on February 23rd, at the Castle Museum, Norwich, the President, Sir F. G. M. Boileau, in the chair, Mr. Clement Reid, F.G.S., sent a note stating that it had been recently discovered that the much-debated *Paradoxocarpus*, not uncommon in the Cromer forest-bed, is the fruit of the water-soldier (*Stratiotes aloides*). It seems difficult to obtain the ripe fruits of *Stratiotes* in this country, and in Germany it does not appear to fruit at all freely. Notes on "Pallas' willow-warbler and other rare European warblers," by Mr. H. E. Dresser, F.L.S., were read. One of the most interesting additions that has lately been made to the avi-fauna of the British Islands is certainly that of Pallas' willow-warbler (*Phylloscopus proregulus*), a single example of which was shot at Cley-next-the-Sea, on October 31st, 1896, by Mr. Ramm. With regard to the range of this bird, it was, until comparatively recently, looked on as strictly an Asiatic species, which had on one or two occasions strayed into Europe proper; but Mr. Zaruduy has found that it occurs regularly on the western slopes of the Ural. In Asia, amongst other places, it is recorded from near Lake Baikal, from the Himalayas, Kashmir, Gilgit, and other places. It frequently passes the winter in Central and Southern China. Although Pallas' willow-warbler cannot be separated specifically from the *Phylloscopi*, it approaches very nearly in its general habits and nidification to the golden-crested wren. Dr. Dybowsbi writes that "its note is melodious and powerful, and its song varied and sweet, and so loud that it rings through the forest, and is astonishing as coming from so small a bird." Some remarks were added by the author of the paper on other eastern warblers which had strayed as far west as the British Islands. Mr. Patterson (Hon. Secretary Great Yarmouth section) read his interesting "Notes" for October, November, December, 1896, and January, 1897. Mr. J. H. Gurney, F.Z.S., read his report on "Norfolk Ornithology for 1896."

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—February 25th, 1897. Mr. R. Adkin, F.E.S., President in the chair. Mr. Bishop, of Kingston-on-Thames, was elected a member. Mr. Billups exhibited for Mr. Sauzé some seventy species of Diptera, Coleoptera, Neuroptera, etc., which had been taken during last year. Mr. Tutt, specimens of *Aglais* (*Vanessa*) *urticæ*, var. *ichnusa*, from Corsica, and remarked that Mr. Merrifield's experiments had resulted in only an approximation to this var.; he also showed specimens of *Thais cerisyi*, var. *deyrolii*, from South-East Europe. Mr. Adkin, two series of *Pachnobia hyperborea* (*alpina*), one from Rannock and the other from Shetland, and made remarks on its local variation and its unaccountably intermittent appearance. In the discussion which followed, Mr. McArthur gave his experience of its appearance in alternate years. Mr. Tutt suggested that the species still retained its boreal habit of remaining two years in a larval condition. Mr. Adkin instanced *Retinia resinella* as having a precisely similar habit. Mr. Mansbridge, a smoky var. of *Spilosoma lubricipeda*, from York. Mr. Tunaley, a large number of species from Aviemore to illustrate his paper and including long and very varied series of *Erebia æthiops*, *Eupithæcia sobrinata*, *Larentia didymata*, *Thera simulata*, *T. firmata*, *Cidaria immanata*, *Emmelesia minorata*, *Pædisca ophthalmicana*, *Gelechia populella*, and others, especially selected to show the range of variation occurring in that locality. Mr. Tunaley then read a paper, entitled "Notes and Observations in a Holiday in the Black Forest of Scotland from July 29th to September 10th, 1896." In a few words he described the geographical surroundings and the geological formation of the district, together with an account of the weather he experienced, and some remarks on the necessary equipment for collecting among the Scotch mountains. He then took the more prominent species, and described the variations, peculiar habits of life, and their protective resemblances. Several of the species were noted as having different times of appearance at different elevations, *e.g.*, *E. æthiops*. He said that *Eloantha solidaginis* at rest on a fir post closely resembled a piece of curled bark, and pointed out the extensive variation in the central band of *T. juniperata*. The paper was interspersed with apt remarks on Scotch characteristics, and terse descriptions of the environment of each species. In the discussion which followed, Mr. Tutt compared the habits of *E. æthiops* in the Alps with the species in Scotland, and also contrasted the allied species, *E. ligea*, which hid in the fir-trees on the disappearance of the sun. Mr. Barrett said that *Epinephele janira* also roosted in the branches of trees at sunset.—*Hy. J. Turner, Hon. Report. Sec.*

NORTH LONDON NATURAL HISTORY SOCIETY.—Thursday, January 28th, 1897, Mr. C. Nicholson, President, in the chair. Miss Florence Villars was elected a member of the society. Mr. Watson narrated how, on January 23rd, in Highams Park, he had rescued a chaffinch which was caught by the wing in a hawthorn bush with the loss of about one feather. Mr. Prout summarised the season, for Entomology, of 1896. For mere collectors it had been one of the worst ever known, but it was pleasant to be able to record an unwonted abundance of most of the butterflies throughout the country, the most noteworthy being *Vanessa antiopa* and *Aporia crataegi*. Sugar had been very disappointing, but 1896 had been an exceptionally good year for the local *Dicycla oo*, and *Caradrina ambigua* had turned up in great numbers. One *Leucania vitellina*, one *L. unipuncta* and a few *L. albipuncta* had likewise been recorded, whilst *Pachnobia hyperborea*, *Noctua sobrina* and *Catocala fraxini* had occurred in the north. Mr. Barrett had recorded a new species, or marked local form, of *Leucania* from the east coast, under the name of *L. favicolor*, and Mr. Carrington had added *Calophasia platyptera* to the British list. Mr. Prout then reviewed the scientific work of 1896, mentioning particularly Professor Poulton's paper to the Entomological Society "On the Courtship of certain European Acridüdae"; Mr. Bacot's work, in conjunction with Mr. F. N. Pierce, of Liverpool, in rearing hybrids of *Smerinthus ocellatus-populi*; Dr. Chapman's paper "On the Phylogeny and Evolution of the Lepidoptera from a pupal and oval standpoint"; and Sir Geo. Hampson's "Classification of three sub-families of Moths of the family Pyralidæ." Mr. Wattson summarised the work in the Odonata during 1896. In the "Entomologists' Monthly Magazine" for August, Mr. McLachlan recorded the capture of eight

*Cœnagrion mercuriale* out of less than a dozen seen in the only known English locality, a certain ditch in the New Forest. Ornithological and astronomical summaries of 1896 were also delivered by Messrs. Austin and C. Nicholson respectively.—*Lawrence J. Tremayne, Hon. Secretary.*

Hull Scientific and Field Naturalists' Club.—The usual fortnightly meeting was held in the Friendly Societies' Hall, Hull, on Wednesday evening, February 17th, Mr. Paul Davis occupied the chair. Notice was given that it was the intention of the Club to hold an Exhibition in the Autumn, and the members were requested to bear this in mind during the summer, with the view of making it a thorough success. The Secretary presented a "Newspaper Extract Book" to the Club, in which he had inserted one or two extracts of local natural history interest. The members were asked to cut out suitable paragraphs for insertion from any papers which they may read, and bring them to the Club, together with the name and date of the paper. If this is carried out the Club will, in time to come, be in possession of a valuable record. The Curator kindly undertook to take charge of the book. It was suggested that the paragraphs, if not too numerous, should be read at each meeting, and, if necessary, discussed, as were the extracts already referred to. Several members gave vent to their feelings respecting the manner in which so-called scientific men are the means of exterminating rare species, both of animals and plants. A further series of South African butterflies, moths, grasshoppers, etc., was exhibited. Mr. C. Waterfall handed round a specimen of the lesser reed-grass (*Calamagrostis lanceolata*) which he had obtained from Hornsea Mere last Autumn; the plant is an addition to the flora of the East Riding. Mr. J. F. Robinson, a Vice-President of the Club, then read a paper on "Charles Darwin and Evolution." The lecturer then gave a *resumé* of Darwin's greatest scientific achievements, and described his method of working as slow, but sure. The paper was illustrated by a number of excellent drawings and specimens, which included examples of "Protective Colouration." A discussion followed, in which Messrs. Davis, Stather, Audas, Seath and Hill took part.—At the meeting held on March 3rd, the President, Dr. J. Hollingworth, M.R.C.S., occupied the chair. Mr. J. W. Boult exhibited specimens of some of the most notable of our British butterflies, together with examples of the same species from Germany, India, Assam, Japan, Africa, and other parts of the world. This most instructive series afforded an excellent opportunity of studying the variations which exist in butterflies from different climates. Mr. Boult also handed round some specimens of the small white ant from South Africa, which is such a pest to naturalists in that part of the world. Mr. J. Porter reported the capture of a specimen of *Hybernia leucophœaria*, at Anlaby, near Hull. Though this moth cannot be said to be a rarity, it does not appear to have been previously noticed in the Hull neighbourhood. From the reports of excursions made, given by Messrs. Robinson, Boult, and Porter, it would seem that some sections of the club are already engaging themselves in field work. Several extracts from the local press were handed over to the curator for insertion in the scrap-book. Some of these were read. Mr. T. Audas, L.D.S., then read a paper on "The Migration of Birds." The lecturer explained that it is only during the last few years that any works have been published respecting this important subject, and it is from the efforts of Charles Dickson, H. Gätke, and a Committee of the British Association, that most of our information on the migration of birds is derived. The final report of the British Association Committee, published in the "Liverpool" (1896) number of the Proceedings, gives valuable information on the point, which has been principally derived from the records collected at the various lighthouses and lightships around our coasts. With the assistance of a map of the world, the routes taken by various species of birds during their summer and winter migrations were pointed out by the lecturer, and a *resumé* given of the explanations offered by different people as to the origin and cause of these migrations. A lengthy discussion ensued, in which the President and several members took part. Owing to the lateness of the hour, the Secretary's paper on the "Extinct Animals of Holderness," was deferred until some future occasion. Some specimens, brought by Mr. Walker to illustrate this Paper, were handed round at the close of the meeting. These consisted of exceptionally fine antlers and bones of the red deer (*Cervus elaphus*) from the "submerged forest" at Withernsea, and a mammoth tooth in excellent preservation, also from this district.—*T. Sheppard, Hon. Sec., 78, Sherburn Street, Hull.*

Cambridge Entomological and Natural History Society.—The annual meeting was held on February 26th, Dr. Sharp in the chair. Professor Newton, the professor of zoology, was elected an honorary member. Mr. Harmer, of King's College, was elected President for the following year. Dr. Sharp exhibited a larva of one of our common Geotrupes, and called attention to its stridulating organ, in which one pair of legs work upon the pair in front of them. He said that this beetle in the imago state also possesses a stridulating organ, but it is situated in a different position anatomically, and therefore not corresponding with the larval organ. The latter is lost in the imago, and it is clear that this elaborate structure exists solely for the larval state. Dr. Sharp acknowledged that he was unable to guess what use such a structure could be to a larva leading, as this does, an underground life, and having, as far as we know, no relations with the lives of individuals of its own species that could be influenced by any sound it might make.—At the meeting of the Society held on March 12th, the President in the chair, Dr. Sharp exhibited, on behalf of Dr. Haviland, part of his magnificent collection of termites. His method of preparation consists in placing the various forms of a species found in one nest in glass tubes, divided into compartments by cotton-wool, and filled with spirit. A photograph of a termitarium of *Termes malayansis*, taken *in situ* after it had been sectionised, showed the royal cell in the middle of the structure, and the chambers for growing fungi—this species being a fungus grower—about the periphery. Portions of this nest and individuals taken from it were exhibited. The nest is composed of thin fragile laminæ of a pottery-like structure, but the royal cell, composed of this substance, is very thick and solid. The fungus-chambers are not constructed of clay, but of comminuted vegetable matter, subsequently cemented together. The specimens taken from this nest includes two queens and one king from the royal cell, large and small soldiers, and large-headed and small-headed workers.—*L. Doncaster, Hon. Sec., King's College, Cambridge.*

## NOTICES OF SOCIETIES.

The Geologists' Association of London.
April 2.—8 p.m., at University College, Gower Street. "Physical History of Romney Marsh": George Dowker, F.G.S. "Collection of Flint Implements from Cookham": Llewellyn Treacher, F.G.S.

*Excursions and Conductors.*

„ 3.—Chesham and Cowcroft. Meet 1.20 p.m., Baker Street Station. Return fare, 2s. 5d.; tea, 1s. 6d. each. Upfield Green, F.G.S.
„ 10.—Aylesbury, Hartwell and Stone. Baker Street Station, 1.20 p.m. Return fare, 3s. 8d.; tea, 1s. 2d. each. A. M. Davies, F.G.S., and Percy Emary, F.G.S.
„ 15.—Easter Excursion, from April 15th to 20th, to Walmer, St. Margaret's, Dover, Folkestone and Romney Marsh. Fare, 8s. 1d. Hotels' tariff, 9s. per day.
May 1.—Cookham. Paddington Station, 1.40 p.m. Ll. Treacher, F G.S.
„ 8.—Whole day. Southborough and Tunbridge Wells (Kent). G. Abbott, M.R.C.S.
„ 15.—Chislehurst (Kent). W. Whitaker, F.R.S., and T. V. Holmes, F.G.S.
„ 22.—Erith (Kent). Flaxman C. J. Spurrell, F.G.S.
June 5 to 8.—Whitsuntide. Cheltenham (Gloucestershire). E. Wethered, F.G.S., and S. S. Buckman, F.G.S.
„ 19.—Whole day. Leighton (Bedfordshire). A. C. G. Cameron.
„ 26.—Merstham (Surrey). G. J. Hinde, Ph.D., F.R.S., and W. Whitaker, F.R.S.
July 10.—Whole day. Peterborough (Northamptonshire). A. N. Leeds, F.G.S., and A. S. Woodward, F.G.S.
„ 17.—Bishop's Stortford (Herts.). Rev. Dr. Irving, F.G.S.
„ 26 to 31.—Long Excursion. Edinburgh. Prof. James Geikie, LL.D., D.C.L., F.R.S.; J. G. Goodchild, F.G.S., and H. W. Monckton, F.G.S.

For particulars of these excursions, apply to Horace W. Monckton, Esq., Secretary for Excursions, 10, King's Bench Walk, Temple, E.C.

City of London Entomological and Natural History Society.
April 27.—Exhibition. See page 312.

The South London Entomological and Natural History Society.
Apr. 8.—"On the Nature of Genera." By J. W. Tutt, F.E.S.
„ 22.—"Some British Spider-crabs." By E. Step, F.L.S.
Papers have also been promised by F. Merrifield, F.E.S., G. R. Grote and others.—*Hy. P. Turner, Hon. Report Sec.*

North London Natural History Society.—The following are amongst the fixtures for next session:
Apr. 8.—Discussion: "The Filices or Ferns." Opened by R. W. Robbins.
„ 22.—"The British Corvidæ" (the Crow family). S. Austin.
May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.
„ 15.—Whole-day Excursion to Brentwood.
„ 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
„ 10.—Debate: "Is Vivisection Justifiable?"
„ 19.—Half-day Excursion to the Lea Valley.
„ 24.—"Clothes-Moths." J. B. Casserley.
There will also be a special-family discussion, entitled "The Liparidæ," to be opened by A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

Lambeth Field Club and Scientific Society.—We have received the following list of fixtures for the forthcoming session:
April 5.—"Simple Types of Plant Life." E. J. Davies.
„ 10.—Visit to Zoological Gardens.
„ 19.—Easter Monday.—Outing to Effingham.
May 3.—"Some of our Smaller Song-birds." E. W. Harvey-Piper.
„ 8.—Outing to Sanderstead (with Selborne Society).
„ 22.—Visit to Kew Gardens.
June 7.—Whit-Monday.—Outing to Cheshunt.
„ 19.—Outing to Caterham. *H. Wilson, Hon. Sec., 14, Melbourne Square, Brixton Road.*

Leicester Literary and Philosophical Society.
April 21.—"Stray Notes on the Aphodii and other Allies." C. B Headly, F.E.S.
May 26.—"Parthenogenesis as it affects Insects." F. Bouskell, F.E.S.
June 5 to 9.—Excursion.
23.—"Notes on Arancidæ (Spiders) of Leicestershire."

## NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names Scientific names and names of places to be written in round hand.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

Subscriptions.—Subscriptions to Science-Gossip, at the rate of 6*s*. 6*d*. for twelve months (including postage), should be remitted to the Proprietors, 86, St. Martin's Lane, London, W.C.

All editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to John T. Carrington, 1, Northumberland Avenue, London, W.C.

### CORRESPONDENCE.

C. E. L. (St. John's).—Mr. Oliver Janson, of Great Russell Street, W.C., will advise you most satisfactorily upon the best books on Coleoptera, and quote you prices. Either Rye's or Fowler's will suit you better than the first named.

R. B. (Darlington).—Can any of your readers recommend any good illustrated books on Diatoms?

S. H. S. (London).—The web is made by the gregarious larvæ of *Eriogaster lanestris*.

W. H. F. (Acocks Green).—If you refer to any good work on structural botany, we think you will find what you require on growth of trees. Also see Loudon's work on "Trees"; it is a standard work.

C. Fielding (Halifax).—Can any one tell me if the voice of the late Professor Huxley was ever recorded by means of a phonograph?

### EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Pair Collins' C eye-pieces, stand condenser, good micro-slides, slide cabinet, photo-micrographs, Wiedersheim's "Anatomy of Vertebrates," Prautl-Vines' "Botany," Hepworth's "Lantern Book," Hogg's microscope, Nicholson's "Manual of Zoology." What offers? Wanted, crustaceans, sponges, star-fish, sea-urchins, foreign shells.—H. W. Parritt, 8, Whitehall Park, N.

Duplicates.—Several hundred British Coleoptera and Lepidoptera; desiderata, local Lepidoptera and foreign stamps.—A. Ford, Claremont, Alington Road, Bournemouth.

Diatoms.—I will send a splendid spread-slide of Diatomaceæ from River Skerne, Co. Durham, in exchange for any other Diatom slide. Open to offers.—R. Borrows, 18, Pensbury Street, Darlington.

Wanted, living examples of Helix lamellata and aculeata, Vitrea draparnaudi, Testacella; also Vertigo angustior, Succinea oblonga. Exchange rarer British shells.—Wilfred Mark Webb, Ellerie, Crescent Road, Brentwood.

Offered, "Natural Science," first nine vols., first three half calf. Wanted, Darwin's "Fertilization of Orchids," Müller's "Fertilization of Flowers," British flowers, European butterflies, or cash.—T. Stephenson, Burnham, Somerset.

Offered, rarer and smaller British marine shells, polished corals, spongy forms, fossils, slides, minerals, objects, etc. Wanted, specimens of Clifton landscape marble. Exchanges numerous.—A. Sclater, Natural History Store, Teignmouth.

Wanted, $\frac{1}{12}$-inch homogeneous objective in exchange for a first-class experimental hand dynamo.—R. Williamson, 3, Keir Street, Pollokshields, Glasgow.

Offered, vars. of H. hortensis and nemoralis, etc., for Anadonta cygnea, Paludina contecta, Unio margaritifer, etc. —W. Domaille, 37, Argyle Road, St. Paul's, Bristol.

Wanted, offers for Science-Gossip, 1865 to 1896 inclusive, 1 to 28 in publisher's cover, remainder unbound; in good condition.—G. P. Bonny, 30, Wellington Road, Stoke Newington, London, N.

Wanted, the loan of, or to purchase, vol. 5 "Cambridge Natural History. Offered, botanical and insect slides or cash.—Walter White, Litcham, Swaffham.

Books.—Good modern books on science, natural history and travel; exchange or sell cheap. Lists sent—J. H. Noble, 5, Bond Place, Leeds.

# THE TOTAL SOLAR ECLIPSE.

By Frank C. Dennett.

THE eclipse of August 9th, 1896, had been looked forward to by British astronomers as visible nigh to hand, and therefore as one which gave a considerable amount of possibility for observation, seeing that the line of totality crossed over such a holiday-resort as the North of Norway. As a whole, the British party may be said to have taken up their quarters at Vadsö, on the banks of the Varanger Fiord, and the story of their disappointment is well known. There was a little more success at Bodö, but the only real good work by our countrymen was that by Messrs. E. J. Stone (of the Radcliffe Observatory, Oxford) and Shackleton (Assistant to Professor Norman Lockyer), who had been taken by Sir G. Baden-Powell in his yacht, the *Otaria*, to the desolate shores of Nova Zembla.

Hither also had gone another, a Russian, party, sent by the Imperial Academy of Sciences, composed of M. Nicolas O. A. Backlund (Director of the Observatory of Poulkova), accompanied by MM. S. Kostinsky and A. Hansky, also Prince Galitzine, and, as zoologist, M. Jacobson. Most interesting reports of this expedition, together with photographs and a resultant drawing, are given in the "Bulletin de l'Académie Impériale des Sciences de St. Petersbourg," for January, and from which the substance of this paper has been drawn, as also the accompanying plates.

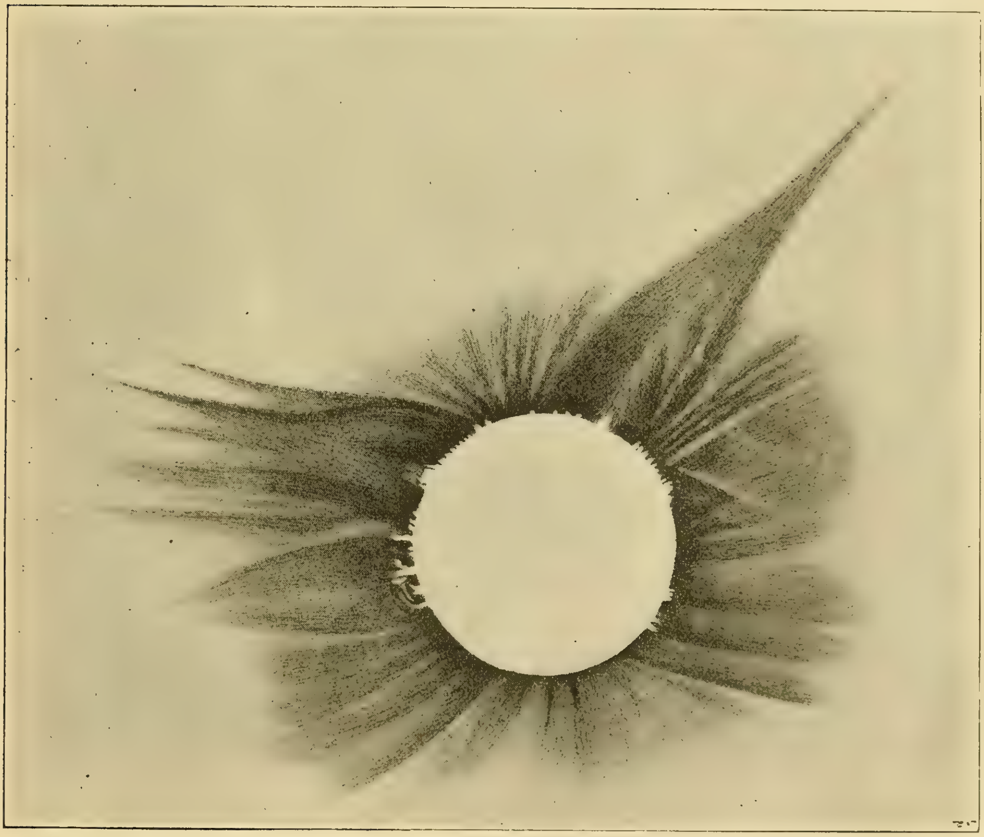


Fig. 1.—Diagram of Total Eclipse of Sun, August 9th, 1896.

The expedition embarked from Archangel on July 22nd, on board the marine transport *Samoêde*, and, thanks to its captain, M. Lilié, and his officers, had a most enjoyable voyage to Nova Zembla, arriving on July 25th. Malya Karmakouly was the

station chosen, as it seemed to offer some advantages, and their treatment by their hosts was worthy of great eulogy.

The expedition had its drawbacks however. The first was shortness of funds. The time for preparation was also somewhat limited. On arriving at Malya Karmakouly, poor meteorological conditions made it very difficult to get the true position of the place or to adjust the instruments, besides proving a discouraging factor to the observers themselves.

On the day of the eclipse itself, at two o'clock the sky was quite cloudy, but towards four the clouds began to disperse. During the eclipse the sky was tolerably serene, though at first light cirrus clouds were over the sun, and make their presence manifest in some of the photographs.

It was resolved that, whether the eclipse was successfully observed or not, the expedition should not be fruitless. Amongst the instruments taken were an equatorial with a 4-in. objective corrected for photography, a photographic camera with a $2\frac{1}{2}$-in. objective attached to the tube of the equatorial, an ordinary photographic camera, a reflecting circle, two box chronometers, and four telescopes for observing contacts with. M. Hansky, with Prince Galitzine, arranged the meteorological observatory.

The equatorial, not having been constructed for so high a latitude, had to be fitted up in an abnormal position, the consequence being that the clock did not work regularly, which becomes painfully apparent in some of the plates.

The programme arranged was to observe the first and fourth contacts with four telescopes and the second and third with two. During the time of totality M. Kostinsky was to take five photographs with the refractor, and M. Hansky three with the camera fitted on to the tube. M. Hansky also proposed to draw the corona during totality. Prince Galitzine proposed to photograph the corona with the ordinary camera, as also the spectrum with the spectrograph. M. Backlund was to take observations around the sun and to give signals, whilst M. Jacobson had to beat the seconds. The party had frequent rehearsals of the plan beforehand, so that when the critical time arrived all might be well prepared to make the best use of the 106 seconds at their disposal.

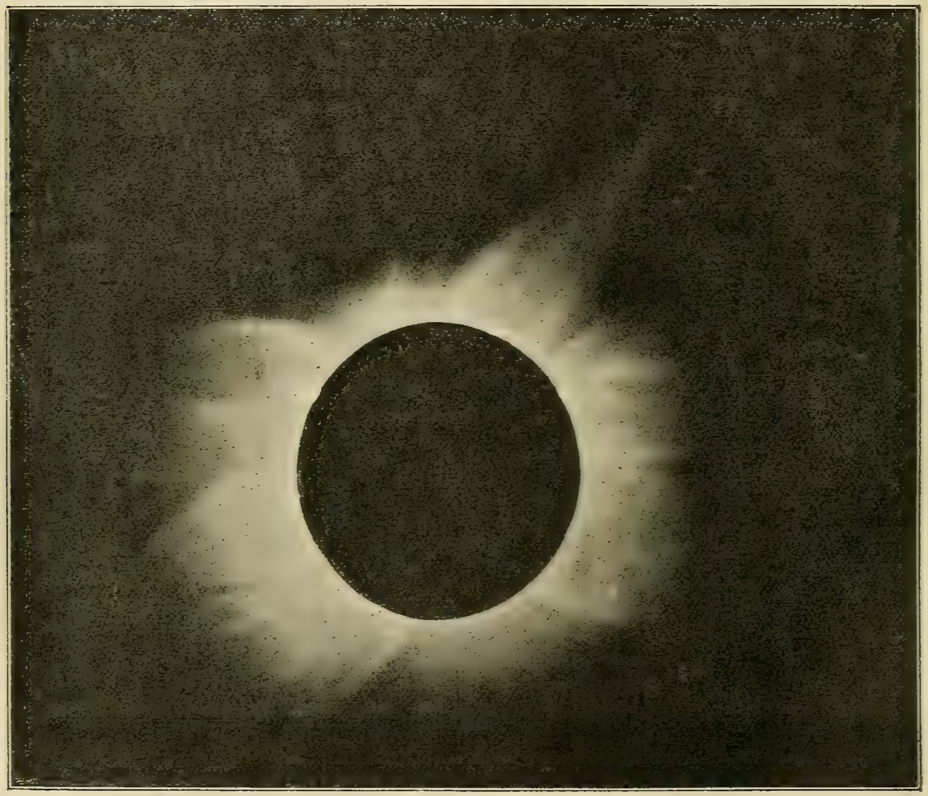


Fig. 2.—Total Eclipse of the Sun, August 9th, 1896.

When the eclipse came, however, unforeseen disturbances arose, so that M. Kostinsky only managed to obtain four photographs. Prince Galitzine obtained four with his camera, but failed with the spectrum, one reason for the failure being that his instrument had too great a dispersive power.

There was a strong wind until after the time of the first contact, but after the second there was almost a calm.

The totality caused such a profound impression that it was difficult for them to recall themselves to the work. The floating cirrus clouds and the shortness of the time prevented the proposed observations around the sun. But Mercury, Venus, Jupiter and Regulus were seen—as also was the case at Bodö. According to M. Backlund, it was so dark that one could hardly see to write n the journal—darker than in full moonlight. In especially when sketching the corona. It was as dark as at two hours after sunset at Odessa."

M. Kostinsky writes that "It was as light as full moon, but the tint was peculiar—orange; the colour of the neighbouring clouds was of the same tint. I only looked at the corona for a few seconds."

Owing to the shortness of the time M. Hansky's drawing was not a success. By the end of the eclipse clouds again covered the sky. But, this notwithstanding, several other photographs of the sun were made during the day. The diagram accompanying this paper (fig. 1) is a resultant one, drawn after the return to Poulkova, and bringing in all the details visible on each of the photographs and calling attention to several minute details which might easily be overlooked if the photographs were alone consulted.

The first photograph taken with the equatorial

Fig. 3.—Total Eclipse of the Sun, August 9th, 1896.

the east the atmosphere appeared bluish, and in the south of an orange tint. Seven seconds before the commencement of totality the red light of the chromosphere [1] was very intense. The corona, which presented a considerable expanse, was of an orange colour.

M. Hansky says, "The colour of the corona seemed to me bluish. I did not see the prominences. The rays were very intense on the left with the naked eye. Little detail with the telescope; more with the unaided eye. The ray turned towards the zenith stretched for at least one or one and a-half diameters of the sun. The others were not longer than a-half the diameter, or even less. A lantern had to be used during totality,

on a plate by Thomas, had three seconds exposure, and the development was carried on until there were certainly no more minutæ to be brought out, a method adopted with each plate. It showed very much detail; but the best photograph was that taken next. "No. 2. Exposure = ten seconds. Schleussner plate. The reproduction (fig. 2) is a little fogged. The corona is of very considerable extent, the principal ray reaching to the edge of the field, and even probably extends beyond it. The details of the corona in its outer portions are very well shown. One can also see all the prominences, but somewhat distorted on account of the slight movement of the image in the direction of the parallel"—in other words from east to west. "It was evident that the clockwork movement was not entirely uniform." These two plates were the most interesting and important taken, from the amount of detail shown.

[1] The chromosphere is the gaseous envelope which surrounds the sun completely to a depth varying from 2,000 to 6,000 miles. This gives bright lines in its spectrum, where dark lines are seen in the spectrum of the sun itself.

The third plate exposed for twenty seconds was altogether the worst taken, from the failure of the clockwork, yet it is most important from the number of the prominences shown. The fourth, a French plate, is interesting from its showing the remarkable phenomenon known as Baily's beads. M. Hansky's plate, No. 1, taken with the camera, had an exposure of "six seconds. The image of the corona is intense and very well brought out. One can follow the whole length of the ray from the sun's limb for 70′. Of all the neighbouring stars, Jupiter alone was obtained. There are no stars, evidently because of the clouds which one can see on the negative. The clearer prominences are also shown." The plate is reproduced (fig. 3) as our third illustration.

The other plates were less interesting from the slight displacement of the image and the clouds.

Prince Galitzine was unfortunate with his first two plates, which were from some specially prepared for the eclipse, by Strezniewsky, and named "Corona" plates, which, although they gave an image of the corona tolerably full of detail, and intense, were yet fogged and spotted. His third plate—a French one—proved more successful. But the fourth, whilst very intense, suffered slightly from fog as well as displacement.

The work of the expedition being done, the exact time determined, the instruments were dismounted. The party afterwards joined Sir George Baden Powell's, and, accepting his invitation, returned in the *Otaria*, making a most pleasurable ending to the expedition. The enjoyment was enhanced when at Hammerfest they fell in with Nansen just returning from his great polar expedition.

Perhaps it should be added that the exact position of the station, to the east of St. Nicolas Church, at Malya Karmakouly, was E. longitude 3h. 30m. 50s., N. latitude 72° 22′·5.

In closing, the writer has to express his acknowledgment of assistance kindly rendered by Mr. Harold S. Geikie in the important matter of translation.

60, *Lenthall Road, Dalston, N.E.*

## MANGANESE DEPOSITS IN GLACIAL DRIFT.

By T. E. Lones, M.A., LL.D.

In the gravel and sands which immediately overlie the chalk in some parts of Hertfordshire are black and reddish-black manganiferous beds of an exceptional character. These beds, which may be seen in some of the gravel-pits near St. Albans, Aldenham and Watford, present a marked contrast to, and may be easily distinguished from, the reddish-brown and yellow beds amongst which they lie. As a rule the manganiferous beds do not pass into but are sharply separated from the underlying and overlying beds; they are markedly lenticular, and are rarely more than nine inches thick. The manganese is present as black oxide in very fine granules, forming a soot-like powder, part of which encrusts the remaining constituents of the manganiferous beds. These constituents comprise angular and sub-angular flints, grains and pebbles of flint, quartz, chalcedony and limonite. Some of the limonite occurs as a pseudomorph after flint, jasper and quartz. The proportions in which the above-named constituents occur in the manganiferous beds vary between wide limits, whilst the proportion of oxide of manganese varies from a small percentage up to about fifteen per cent., by weight, in the richest samples taken from the beds. By carefully washing a sample of the deposits, the whole of the oxide of manganese, mixed with flint, limonite, quartz, and other grains of small size, can be separated from the rest of the sample as a very fine, jet-black and plastic mass. A thoroughly dried sample of a rich mud of this kind yielded, very nearly, on analysis: $Fe_2O_3$, 17·1 per cent.; $MnO_2$, 33·2 per cent.; silica as quartz, flint, etc., 50·7 per cent. = 100·0.

In all the Hertfordshire gravel-pits, the richest and most persistent deposits of oxide of manganese occur in the lower parts of the gravel and sand. In one of the pits near Watford an unusually thick manganiferous bed occurs, but the percentage of manganese is small. The beds are, in all cases, horizontal or only slightly inclined. Collectively, the beds appear to cover a large area; the largest bed at present exposed does not, however, appear to extend over more than a few hundred square yards. It is almost unnecessary to state, after the above description, that the manganiferous beds are too thin to allow of their being worked for the oxide of manganese they contain.

Judging from their general appearance and the occurrence therein of numerous pebbles and rounded quartz-grains, the manganiferous beds would seem to have been deposited by the waters of a river. All the pits in which the manganiferous beds have been seen by me are not far from the River Colne, and are within its valley. An interesting question in connection with these manganiferous beds is that relating to the determination of the origin of the oxide of manganese. It is generally admitted that the pebbles of quartzite, lydian-stone, and some other associated rocks found in the drift, were transported by the action of ice

from the Triassic beds of the Midland counties. The evidence obtained from an examination of the manganiferous beds would seem to show that the oxide of manganese was transported in a similar way. Amongst some of the beds in one of the gravel-pits near Watford I found a block of quartzite which enclosed between the walls of a very narrow fissure a quantity of manganiferous powder; this powder was black, and resembled that found in the beds. In the "Geology of the Warwickshire Coal-field," one of the memoirs of the Geological Survey, it is stated that at Tuttle Hill, near Nuneaton, the quartzite contains oxide of manganese in joints and fissures of the rock, and that at one time the quartzite was worked for the oxide of manganese which it contained. The quartzite in which the manganese occurred in the Watford gravel-pit was similar to the quartzite found near Nuneaton. Lumps of oxide of manganese, weighing from one to sixty pounds each, are found in the New Red Marl near Nuneaton, and have been profitably worked. Such lumps may have been the source of some portions of the manganiferous beds of Hertfordshire.

From the above facts, it may be reasonably inferred that some of the quartzite and other blocks found in the glacial drift of some parts of Hertfordshire were transported, together with oxide of manganese, from the Nuneaton district, and were afterwards re-arranged and re-deposited by the action of water in motion.

*Rokeby Lodge, St. Alban's Road, Watford, Herts.*

## COLLECTING DESMIDS.

By R. Williamson.

THE following hints result from the experience of several years' practice in gathering desmids. It is astonishing what a large number of forms will often be found in places which may have been passed many times without detecting them. The best places to procure desmids are small pools on open moors, on peaty ground; pools which are exposed to sun and rain. Next, are freshwater lochs, lakes, ponds and ditches; in fact, they may be found almost anywhere where water collects without becoming stagnant.

In many cases desmids may be seen with the unaided eye as minute green specks in the water, but in the majority they will have to be looked for with a pocket-lens, and later under the microscope at home.

Having indicated where to find the desmids, I will now proceed to point out the best way of collecting them. First provide yourself with a number of test-tube bottles having flat bottoms, and fitted with corks. In size, three-quarters of an inch by three inches long is very suitable. The most convenient way to carry the specimens is to get an ordinary elastic cricket-belt and fasten on to it a piece of cloth, linen or canvas, which has been folded and stitched up in such a way as to leave pockets the correct size for the tubes to slip into tightly. In fact the whole arrangement, when finished, bears a strong resemblance to an ordinary cartridge-belt. In this way twenty or more tubes may be carried clasped round the waist and under the coat away from observation. It is a system also convenient for taking out a tube with wet fingers and replacing when filled.

In order that one may with some reasonable certainty expect to find such small objects in such a quantity of water recourse must be had to straining the water on the spot. This is easily done by means of a muslin conical funnel with a bottle attached to a wire ring fixed to the end of a walking-stick. (See fig. 1.)

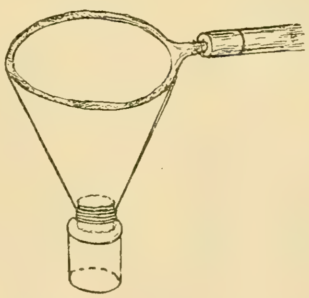


Fig. 1.—Straining-Net for Desmids.

A suitable size is one having a ring six inches in diameter, made of quarter-inch round wire. The muslin cone is stitched to the ring. The small end of the cone is left open about two inches in diameter, and tied with string to a two-ounce wide-mouthed bottle. The depth of cone should be about six inches.

With this instrument the water may be searched by hand, or in the case of small pools it may be filled by means of a small bottle used as a ladle to lift water into the funnel. Of course, the water passes through the muslin funnel, leaving the desmids on the inside. These gradually gravitate into the bottle. When a sufficient quantity has been thus filtered, empty the contents into one of the test tubes. In this way a very rich harvest may be carried home in very small bulk. It is advisable to take samples from pools which may only be separated by a few yards distance, because different types may often thus be found quite close

to each other. Before leaving the pool it is important to take a small quantity of the mud from the bottom and put it into the test-tube with the desmids. About as much as will cover the bottom of tube by three-quarters of an inch will be sufficient. Always choose a sunny day by preference for collecting, for it is then the largest quantities of desmids come to the surface, and may often be seen as a green scum on the top of the mud. If the day be dull and you take a small quantity of the mud, the desmids are sure to be found, as will be later described.

The most convenient method of collecting the desmids from the surface of the mud at the bottom of the pools is by means of a large pipette (see fig. 2). This is made with a piece of quarter-inch or five-sixteenth-inch glass tubing about seven inches long, and having fixed to the top an india-rubber air-ball about one and a-half inches in diameter. Such balls can be obtained from dealers in photographic apparatus, as they are largely used for pneumatic releases in connection with instantaneous shutters of cameras. To use the pipette, press the ball to expel the air before entering the water, and until the point of the tube almost touches the surface of the mud. Then, on releasing the pressure on the ball, as much water as you desire will be sucked into the pipette and thence conveyed into a test-tube. This pipette will be found invaluable after some practice, as by means of it clusters of desmids which can be seen growing up from the mud in a thin filament can be sucked up quite clean and without any adhering mud. It is also a most useful tool to use at home in changing desmids from one tube to another when required.

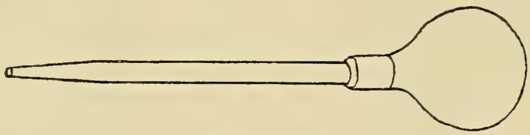


Fig. 2.—Pipette.

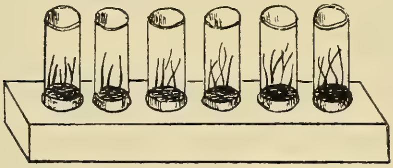


Fig. 3.—Test-tube Stand for Desmids.

On reaching home, remove the corks from tubes, and place them into a stand such as shown in fig. 3. This is constructed with a block of wood having holes drilled in it. The stand must be of a suitable size to hold six tubes nine and a-half inches long by two inches wide and one and a-half inches deep, the holes being bored three-quarters of an inch deep and of a size to ensure that the tubes will drop in freely. As many stands may be made as desired. The size given takes up little space, and will rest on a window-frame or sill.

Place the stand of tubes near a window; if facing the south cover the tubes with a piece of gauze or muslin to prevent the growth of confervæ and keep the dust out of the tubes. In a day or two the desmids will be seen growing in large clusters up the tubes, when they may be taken out perfectly clean with a small pipette for observation, or transferred to a tube of clean rain-water for a few days. In this way large quantities of perfectly pure gatherings may be obtained. The desmids can often be observed under the microscope, *in situ*, in the tubes, and much valuable information obtained regarding their growth. Use a low-power object-glass, not less than one-inch. The convexity of the tubes does affect the image, but on the line along the centre of the tube sufficient view will often be obtained, and the tube can be turned all round for examination. Before putting a tube under the microscope fill up with water and insert the cork until the surplus water overflows. The contents of the tube may then be examined without disturbing the position of the desmids growing inside. To facilitate the examination of the tubes under the microscope, make a small table (to rest on stage of microscope) out of a piece of cigar-box wood, about four inches long by two and a-half inches wide, with a narrow piece half an inch wide, glued at right angles. Against it the tube rests when the microscope is inclined. Cut a round hole one inch in diameter in centre to allow light from mirror to pass through. (See fig. 4.)

To transfer small quantities of desmids from

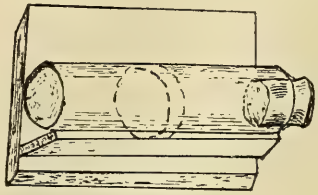


Fig. 4.

tubes to slides a small pipette made with a child's feeding-bottle rubber teat on end will be found very handy. These small pipettes can be obtained

from chemists ready-made and are known as medicine droppers.

It will be found by spending a few hours collecting as above described that sufficient material has been obtained to keep anyone well employed for months in examining the desmids. It has been a matter of great astonishment to find what a large number of different species may be obtained from a neighbourhood usually undreamt of as being so prolific. Many of the types are very beautiful and can only be seen with quarter-inch or one-sixth-inch objectives.

If after some time any of the tubes show signs of becoming stagnant, all that is usually necessary is to aerate them by means of the pipette. Put the instrument down to the bottom of tube and compress the ball several times, being careful not to use too much force or you may discharge the contents into your face. This, of course, disturbs the desmids that may have been growing, but that does not matter, as when all becomes settled again the desmids will soon come to the top

3, *Keir Street, Pollokshields, Glasgow.*

# TIDE-WAIFS ON THE FORTH SHORES.

By Robert Godfrey.

THE shore has ever been one of the chief hunting-grounds of the naturalist, and in spite of the care bestowed upon it by those in quest of its spoils it has still new secrets to show them at subsequent visits. Though at all times attractive the shore is especially interesting after a storm, as then it bears on its open face the relics of wind and tide, and affords us opportunities of examining at close quarters objects which during the calm are kept beyond our gaze. All classes of life suffer from a continuance of heavy storms, but the lower forms, as is to be expected, chiefly fall victims to the violence of the gale. Every gale carries destruction with it, and according to its intensity leaves more or less evident traces of its passing. Sometimes a storm will strew our foreshore with a compact mass of medusæ, forming a continuous line for a mile or more along high-water mark, or at other times a terrific gale will throw up superabundance of molluscs of many species, starfishes, and such like. The effects of storms on invertebrate life is immediate, so that the reason for the destruction is generally self-evident.

Our object at present, however, is to consider some of the vertebrate forms of life found dead on the Forth shores after storms. At such times a sure find, especially on the West Lothian foreshore, is the angler-fish (*Lophius*), and very often this is the only vertebrate to be found as a waif immediately after a storm. Several of these unwieldy-looking fish are often cast up at one time, and that they are the direct product of the storm is proved by their well-nurtured condition and by the presence of food in their stomachs. *Lophius* varies in length from fifteen to forty-eight inches, the average size of those thrown up being three feet. It is a formidable-looking monster from its flattened shape and broad mouth, the lower jaw of which protrudes far in front of the upper—as also its projecting spikes and ridges above the skull. Its curious guise is enhanced by the tiny fin-ray-like appendages that spring from the dorsal line, and by the rows of papillæ round the edge of the lower jaw and along its sides. These fin-ray-like appendages, or "fishing-rods," are six in number, situated on the dorsal line between the upper jaw and the pectoral fins; two lie in front of the eye region, one behind it, and three between the pectorals; they are elongated and covered with skin, and flexible at their bases. The "fishing-rods" are reputed to be employed by the angler-fish as he lies sluggishly on the sea-bottom in enticing smaller fish to approach, when they at once fall victims to his enormous jaws. The papillæ referred to may help to hide the angler more completely by their resembling tiny fronds waving all round the edge of his lower jaw. But this question of wilful trapping on the angler's part is a difficult one to handle, and may easily be stretched beyond the actual facts.

Besides the angler, conger and saithe are occasionally thrown up; but no fish has suffered such destruction in our area as the saury-pike. This rare fish, when it does appear in the Forth, comes in enormous shoals, and has on at least two different occasions been destroyed in almost incredible numbers. In November, 1768 (1), great numbers of saury-pike were thrown ashore on the sands at Leith, after a great storm from the east; and again, in 1855 (2), after an east or north-east wind, they swarmed in the Forth. Some idea of their numbers may be obtained from the following account given in the "Alloa Advertiser" of the time: "On the afternoon of Monday (29th October), but especially on Tuesday, and partially on Wednesday (31st), vast shoals of fish of the genus *Scombresox*, technically known by the name of saury-pike, ascended the river Forth, and were gladly welcomed by the citizens of Alloa, more especially by the humbler classes of the community. The Forth, betwixt Kincardine and Alloa, during the days above-mentioned (particularly

(1) Pennant.

(2) Proc. Royal Phys. Soc., Edin. i., p. 51.

Tuesday) was literally swarming with these fish, and millions of them have from first to last been captured. Hundreds of people lined both banks of the river on successive days, and came away with bags, baskets, and boxes laden with the herrings; hundreds of young people, while wading along the margin of the river, picked up armfuls of the fish; parties cruising about on the river gathered up the herrings as rapidly as they chose with their hands from the side of their small boats; parties in Alloa, Kincardine, Kennet, Alva, Tillicoultry and Stirling, obtained cart-loads of them, and sold them to ready purchasers; and numbers of the fish were destroyed by the paddles of the Stirling steamers."

In considering the birds, we notice a great difference in the way in which their death-rate is affected by storm. The destruction caused by the united efforts of wind and wave is, in the case of fishes and of invertebrates, direct; whilst in birds, though oftentimes severe, it is indirect. Repeatedly I have traversed the shore in search of birds cast up as waifs after storms, and I have been quite surprised at the almost entire absence of such; but when I have returned by the same way two or three weeks after the storm, I have found birds in abundance along the tide-edge. Though the storm brings the birds nearer shore, it does not directly destroy them; the birds struggle on sometimes for weeks against death, but often succumb finally through sheer exhaustion. In some way or other the storm affects their food-supply, and starvation seems in most cases to be the direct cause of death. Sometimes guillemots are met with lying on the sand or sitting upright beneath the sea-bank, and when touched they show fight bravely; but these birds are beyond hope, having been borne helplessly to land after resisting starvation as long as they could; sometimes too the razorbills close inshore are seen to struggle violently in their efforts to dive, displaying their inability to perform their ordinary functions without the greatest labour.

Though there are outstanding instances of great losses of bird-life, such as that which took place in the beginning of 1895, yet few seasons pass without minor wrecks of life taking place. In the majority of cases, the species that suffer most terribly belong to the family of the Alcidæ, though sea-birds of other families are often met with in the hosts of storm-tossed waifs. During the present winter I have found, lying dead on the tide-line, nineteen species of birds in my occasional rambles along the Forth shores. As usual, guillemots and razorbills prevailed throughout the area examined. These two species are sometimes destroyed in great numbers, succumbing to the after-effects of the storm. They contain nothing in their stomachs save a little black oily fluid, and have occasionally parasitic worms in their gullets. Along with these species puffins are found on some parts of our coasts, but here the puffin is a rare waif; I noticed only one this season.

A minor destruction of little auks—mainly noticeable during the first half of February—has again taken place along our east coast. One Edinburgh bird-stuffer received nineteen specimens, all of which, with one exception, were females. On February 4th I was out in search of this bird on the West Lothian foreshore, which proved a very productive area during the 1895 incursion, and I found three individuals all more or less mutilated by carrion feeders. On the following day I crossed to Fife on a like errand and picked up seven specimens. Not one of these latter had been touched by the carrion feeders, which was sufficient proof of their freshness. In two cases the birds seemed to have dropped just before I found them; they lay with their wings half-spread and their plumage unruffled, having unwillingly come to land after baffling with the storms of the North Sea, and settled in the most peaceful attitude possible, sinking through sheer exhaustion.

The most important waif, to me, during the season has been the fulmar petrel, a specimen of which I picked up on the East Lothian foreshore on December 15th last. The bird had lain only a few days, but had been so mutilated by the hooded crows as to be rendered useless for preservation; it provided me, however, with skull and breast-bone. This ocean bird of powerful flight is occasionally driven into the Forth, but this is the first occasion on which I have personally met with it here.

In connection with some of these birds, little auk chiefly, the conclusion is impressed upon one that such individuals as happen to be driven from their normal ocean haunts to our shores in winter never again return, though they succeed in baffling their fate for a time. Razorbills and guillemots, though not so strictly oceanic, may often be seen close to the shore in such attitudes as imply their impending doom, and individuals continue to die long after the first disturbing cause has passed off, whilst the extended time throughout which little auks during a severe wreck of life continue to be thrown up shows that a similar state of affairs prevails with respect to these birds. A friend in Shetland, writing in connection with this subject, says: "I remember having watched from day to day three little auks in a quiet bay near Lerwick, in 1860, and although they seemed to be very lively for about a week, they gradually became more feeble, and in the course of three weeks I found two of them lying dead upon the beach and the third in a dying condition close to the water's edge." This is typical of the fate of the majority, if not of the whole, of the little auks seen off-shore in winter.

*46, Cumberland Street, Edinburgh;*
*April 3rd, 1897.*

## SCIENCE A MONOPOLY.

OUR correspondent who in the January number of SCIENCE-GOSSIP (*ante* p. 213) had occasion to take exception to a paragraph in "Natural Science" which had for its inspiration the address of Dr. W. Trelease to the Botanical Society of America, again writes as follows: "My criticisms were founded on the excerpts and comments given in that periodical; but since then, through the kindness of Dr. Trelease (not Professor, as he is called in 'Natural Science') and the courtesy of the editor of SCIENCE-GOSSIP, I have been enabled to see the original address, and I would take this opportunity of thanking these gentlemen for their attention. On carefully perusing the original and then comparing it with the garbled account which elicited my criticisms, a great difference is to be noted, and an apology is certainly due from me to Dr. Trelease, which I readily tender; but I can plead extenuating circumstances. By itself the sentence to which objection was taken certainly does appear to be an attack on 'amateurs,' but when read with the context, and with other parts qualifying it, it certainly cannot bear the construction which I put upon it. In fact, when we bear in mind the different social conditions which prevail on the other side of the Atlantic, there is nothing that any lover of science can take exception to in the whole of the address. Instead of attacking the 'amateur,' Dr. Trelease gives as an example of how scientific work should be done the methods adopted by Dr. Engelman, a busy physician who in his spare time did so much to advance our knowledge of the North American flora. Dr. Trelease's estimate of amateur work is in accordance with that of Professor Huxley, as witness the concluding paragraph of his address above referred to, which I cannot refrain from quoting: 'Hence, though it is certain that the most voluminous and, perhaps, the most comprehensive results, and those resulting from the performance of coherent experiments extending through a long series of years, will come from the great centres of research, there is no reason why qualitative results equal to the best may not continue to come, as they have in the past, from isolated workers, to the rounding out and completion of whose studies the facilities of the larger institutions will be more and more applicable as the problems of equipment are worked out.' Had this sentence been quoted in 'Natural Science,' my first communication would never have been written, and I must again thank Dr. Trelease for pointing out that my criticisms of his views were founded on a misconception of them.

"This courtesy from America stands in pleasant contrast to the conduct of a prominent science official in this country which recently came under my notice. A natural history society, whose headquarters are not a hundred miles from Charing Cross, decided, in consequence of 'the spreading of the hideous town,' to draw up lists of the local fauna and flora of the London district. The object was to preserve for future generations many facts in the local distribution of plants and animals before the neighbourhood is quite built over. In furtherance of this object letters were written to all naturalists living in the district, asking for assistance. Offers of help were at once given by, amongst others, Sir John Lubbock, Mr. H. E. Dresser, F.Z.S., and the late Mr. Jenner Weir. But there was one discordant note. This science official, holding a high position in one of the scientific institutions in this country, was written to, and his answer is now in my possession. He displayed his ignorance of local distribution by stating that the fauna and flora of that district would be the same as that of any other similar district, and concluded by expressing his opinion that 'the members of the society would be much better occupied in counting the number of lamp-posts.'

"These remarks speak for themselves; but the attempt to discourage a small, struggling society in a laudable effort to add to our knowledge was neither gentlemanly nor scientific. In spite of his letter, the society has already issued several lists, and has added to the county at least a dozen fresh records for plants.

"Complaint is made again and again of the approaching extinction of the old-fashioned 'field naturalist,' and if such conduct as I have just mentioned is becoming common among the would-be monopolisers of science, it is not to be wondered at. In conclusion, I would point out that the Editor of 'Natural Science' has disclaimed all intention of attacking amateur naturalists (*vide* 'Natural Science' April, p. 286, line 20). I accept this personal explanation absolutely. What I said and still say is that his way of putting things did actually lead people to read into his remarks ideas which they regretted. I am glad, however, to find that it was his style and not his heart which was at fault."

DAY-FLIGHT OF BAT.—On Sunday, April 4th, I saw a bat flying backwards and forwards over a space of about thirty yards. The hour was 2 p.m., and the weather bright. In two hours time I returned to the spot and found the bat still flying. The space covered lay between trees, but very rarely did the animal leave the road—if I may use the phrase. Once it swooped down to a lake of water which stands near the road and disturbed the surface. All the while it kept up a squeaking or whistling noise, but not very loud. I could see no insects overhead, but I have no doubt of their presence in the vicinity.—*William Thompson, Stroud, Gloucester.*

## GEOLOGICAL FIELD CLASS.

THE London Geological Field Class, which was established in 1886 to impart practical knowledge of the Physical Geography and Geology of the London district, commences the summer course for 1897 on May 1st. The teaching is given during excursions made on Saturday afternoons, between the beginning of May and the middle of July. It has been organized and carried on by Professor H. G. Seeley during the past eleven years, in the form of short lectures upon rock-structures and fossils seen in quarries, and explanations of the contours of the hills, valleys, and river channels which are examined. The excursions illustrate the principles of geology by means of facts which appeal to the eye in scenery which is easy of access. They are open to ladies and gentlemen. They are not designed exclusively for students preparing for examinations, but are intended for all who are interested in nature, and find pleasure in examining the form and structure of the country.

Professor Seeley revises any notes of geographical or geological structures seen or drawn in the excursions which are sent to him by post, and generally assists the members of the class in their investigations. Reports written by members of the Field Class form the "Handbook" of the London Geological Field Class, which is published by Mr. G. Philip, of London. The volume records some of the observations made during past years.

This year a distinctive feature will be the examination in successive excursions of a line of country running north to south, so as to see the succession of the strata between Sheppey and Tunbridge Wells, to illustrate the physical geography and geology of hills, valleys and rivers in the basin of the Thames.

The excursions will be personally conducted by Professor H. G. Seeley, F.R.S., and will be as follows: First Series, Hon. Class Secretary, Stephen Miall, B.Sc., LL.B., 4, Endsleigh Street, W.C. (1) May 1st, Leith Hill (Lower Greensand); leave London Bridge 2, arrive Holmwood 3.17; leave Dorking 8.23, arrive London Bridge 9.40. (2) May 8th, Caterham to Redhill, *via* Godstone (Upper Greensand); leave Cannon Street 2.17, arrive Caterham 3.12; leave Redhill 8.50, arrive Cannon Street 9.37. (3) May 15th, Snodland to Aylesford (Gault); leave Cannon Street 2.37, arrive Snodland 4.5; leave Aylesford 8.54, arrive Cannon Street 10.17. (4) May 22nd, Tunbridge Wells (Wealden Beds); leave Cannon Street 2.23, arrive Tunbridge Wells 3.40; leave Tunbridge Wells 8.5, arrive Cannon Street 9.10. (5) May 29th, Sheerness, drive to East Church, Hensbrook (London Clay); leave Holborn Viaduct 1.25, arrive Queenborough 3.25; leave Sheerness 8.5, arrive Holborn 10.10. Second Series, Hon. Class Secretary, J. W. Jarvis, St. Mark's College, Chelsea, S.W. (6) June 12th, Coulsdon to Merstham (Lower Chalk); leave Cannon Street 2.17, arrive Coulsdon 2.59; leave Merstham 7.55, arrive Cannon Street 8.37. There will be no excursion on Saturday, June 19th. (7) June 26th, Aylesford to Maidstone (Lower Greensand); leave Cannon Street 2.37, arrive Aylesford 4.9; leave Maidstone, 8.45, arrive Cannon Street 10.17. (8) July 3rd, Halling to Rochester (Chalk); leave Cannon Street 2.42, arrive Halling 4.10; leave Rochester 8.58, arrive Cannon Street 9.55. (9) July 10th, Hildenboro' to Sevenoaks (Lower Greensand); leave Cannon Street 2.23, arrive Hildenboro' 3.42; leave Sevenoaks 7.49, arrive Cannon Street 8.55. (10) July 17th, Upnor and Rochester (Thanet Sands and Woolwich and Reading Beds); leave Cannon Street 2.37, arrive Strood 3.51; leave Rochester 8.58, arrive Cannon Street 9.55.

The walking distance is usually from three to five miles. Arrangements will be made so that tea may be taken, at a fixed price, at the place from which the return journey is made. The railway companies will issue tickets for the excursions to members at greatly reduced rates. Rain will not prevent the excursions. Attention is drawn to Sheet 12 of the Index Geological Map of England and Wales, which includes all the localities visited by the Field Class. The contoured maps of the new Ordnance Survey are useful. Mr. W. Whitaker's "Geology of London," vol. i., gives in detail the tertiary geology of this district.

All travelling arrangements, and other details for the comfort of members, are made by the Committee and Honorary Secretaries of the Class. Members are also elected by the Committee, which consists of the following:—H. G. Seeley, Nicol Brown, R. H. Bentley, J. W. Jarvis, S. Miall, W. Creighton, H. G. Erith, J. B. George, J. Herbert Hodd, J. Kidd, A. L. Mann, W. W. R. May, J. E. Piper, G. Prosser, and M. Y. Woolf. The number of members is necessarily limited. The fee for the season's excursions is one guinea; for the first four, or for the last four, it is half-a-guinea. Old members pay half-a-guinea for any four excursions, and three shillings for any single excursion. When circumstances permit, and adequate notice is given, members have the privilege of introducing a friend, on payment of three shillings for a single excursion. Particulars of membership may be obtained from the Honorary General Secretary, R. Herbert Bentley, 43, Gloucester Road, South Hornsey, N.

# THE MIGRATION OF BIRDS.

(*Continued from page* 299.)

## SEASONAL.

"*Autumn Emigration.*—It is somewhat difficult to determine what species among our British summer visitors are true emigrants during July. There is no doubt, however that the departure of adult cuckoos dates from the latter days of the month, when they not only appear on the coast-line but are occasionally killed against the lanterns of the light-stations. The swift is another species that appears with some frequency at the stations, which fact indicates that the ebb of its summer sojourn in Britain has begun.

. . . . . . . . .

"Another class of migratory birds, namely, certain plovers and sandpipers, which spend the summer inland and the autumn and winter on the shore, also appear on the coast in small numbers accompanied by their young. The young of several species of sea-fowl—razorbill, guillemot and puffin—are mentioned as leaving their rocky nurseries during the month. Lastly, it is certain that some of the movements recorded for this month are due to spells of ungenial weather. This aspect of July emigration, however, belongs to, and will be treated of under, the Meteorological section of this digest. During August much emigration among our summer visitors is witnessed, and thirty-three species are recorded as departing. Of the birds which are partially migratory, no fewer than thirty-four species are noticed as emigratory during August, though, perhaps, all are not necessarily passing beyond the British area. Both these groups of emigrants are, in all probability, swelled during this and other months by birds of the same species which pass the summer in countries north of the British Isles, and which, having reached our shores as immigrants, are also moving southwards along our coast-lines. September witnesses the height and close of the emigration of the bulk of the smaller British summer visitors, most of which are absent from our chronicles for October. The movements of forty-two of these emigrants appear in the records for the month; while those of the partial migrants are also considerable, over forty species being recorded. There are often during this month considerable emigratory 'rushes' on the part of both these groups of migratory birds, due to outbursts of ungenial weather in our islands. The October emigrants among the summer birds are not numerous, and consist of laggard representatives of their kinds. Only twenty-two species are recorded in the chronicles for the month, and some of these are only observed occasionally. The partial migrants, on the other hand, are much on the move, and are numerous both as regards individuals and species, their ranks no doubt being considerably recruited by numbers of the same species from the north, which sooner or later emigrate in their company. These movements are often pronounced, and 'rushes' are recorded; but they cease by or during the first half of November.

"It is during the great autumn emigrations that the birds are observed on *all our shores simultaneously.* Emigratory birds are observed passing southwards, and feeding as they go during the daytime; but their flight to lands beyond our shores is usually undertaken during the night-time.

. . . . . . . . .

"*Winter Movements.*—In November, and not later than the middle of the month, the *ordinary* autumnal southward movements on the part of birds of passage and of British emigrants cease. These normal seasonal movements are followed later in the month by emigratory movements of a very different nature, and entirely due to a decided fall in temperature, usually in the form of outbursts of frost, and to snow. These conditions drive certain species specially affected either to warmer districts within the British area or to southern regions beyond our shores . . . They are repeated during each cold spell in the months of December, January, February, and in some exceptional seasons as late as the third week of March.

. . . . . . . . .

"The appearance of these birds on the coast in the late autumn and winter has led them to be regarded as immigrants from abroad. But when the whole of the data relating to their distribution is examined, the true nature of these movements is no longer doubtful; and this is the case quite apart from the weather conditions, which, in all instances, also afford an unfailing clue to their true character. If the cold is very severe and prolonged, the isles off the south-west coast, such as Scilly and those off the west coast of Ireland, are sought, and many birds are observed at the southern stations to quit both Britain and Ireland. . . . In the terrible December of 1882 even these usually safe western retreats failed the refugees, and many succumbed, the hardy snow bunting perishing along with the rest. The Januaries of 1881, 1885 and 1887 were also very severe, and were months of great cold-weather movements. In 1881 many birds died of starvation at Valentia, then the least cold corner of the British area. During exceptionally severe winters there is a renewal of immigratory movements from the Continent by way of the east and west route across the southern portion of the North Sea. On arriving on our south-eastern shores the larks, starlings, thrushes and lapwings, which are the species recorded, move along the south coast of England, and probably seek the warmth of the south-west, the Scilly Isles and Ireland. The species which appear to be specially susceptible to cold, either constitutionally or through deprivation of food (most probably the latter), are the mistletoe thrush, song thrush, redwing, fieldfare, blackbird, greenfinch, linnet, starling, lark, water-rail, lapwing, curlew, snipe and woodcock. In mild winters the only movements recorded are a few local migrations, which strictly coincide with the occasional periods of cold from which hardly any season is entirely exempt.

"Cold-weather migration is performed during both the night- and day-time. If the flight is an extended one it is probably undertaken at night, for much emigration is observed at southern stations during the hours of darkness.

"*Spring Immigration*.—The first bird-harbingers of spring are recorded for February, when during genial periods such partial migrants within the British area as the pied wagtail and lapwing return to the Orkneys and other northern stations, where these species are summer birds. Certain rock-breeding sea-fowl are also noted as visitors to their nesting-haunts. There is, in addition, indication of a return movement during mild weather on the part of fieldfares, redwings, thrushes, blackbirds, etc., which had fled the country through the winter cold. During February certain summer visitors have occasionally put in a phenomenally early appearance. In 1885 and 1887 the wheatear was seen; in 1887 a ring ousel was shot at one of the light-stations; and in 1886 (on the 24th) a solitary swallow was observed at the Eddystone. During the genial periods usually experienced in the changeable month of March there is a considerable immigration or return of the birds which quitted our islands through the pressure of the severe weather conditions of winter, and also of some partial migrants, including many goldcrests and pied wagtails. In most years the advent of a few summer visitors is recorded. The ring ousel, wheatear, whinchat, willow wren, chiffchaff, swallow, sand martin, cuckoo (¹), land rail, garganey, whimbrel and Sandwich tern are recorded for the month, some of them once only, and others rarely. April is a month of pronounced immigration on the part of the summer visitors, for no less than thirty-seven species are recorded in the chronicles. It thus witnesses the arrival of certainly the majority of species among the spring migrants, though, perhaps, not of individuals. . . .

"In connection with the arrival of these earliest immigrants among our summer visitors during March or April, a remarkable and interesting fact remains to be mentioned, namely, that the great majority of these birds are recorded first for the south-western area of the British region—the south-west coast of England and Ireland. Thus, in March, out of ninety-four observations, seventy-one, or seventy-five per cent., were made in the south-west. In April, out of 157 first records of the arrivals of summer visitors, no less than 115, or nearly seventy-four per cent., are chronicled for the south-west coast and Ireland. These numbers and percentages, however, should be *considerably higher* and more remarkable, for it must be explained that during the years 1880 and 1881 there were no spring data for Ireland, and in 1883 there was no return made for the west coast of England, while the east coast has been credited, in the statistics quoted, with the observations made during all the years of the inquiry. It thus seems probable that the first arrival of the spring migrants not unnaturally occurs on those parts of our isles which are the warmest so early in the season. During May the immigration of summer birds still flows into our islands. Several species make their first appearance, and a number of others are more abundantly recorded than hitherto. There are also considerable arrivals of wheatears, warblers, swallows, and sandpipers and plovers of various species, on our southern coast quite down to the end of the month, some of their movements being very marked. These are undoubtedly birds of passage on their way to northern summer haunts beyond the limits of the British Isles, for our own birds of the same species are then busily engaged in incubation or tending their young.

(¹) At Langness, Isle of Man, March 28th, 1887.

During the first half of June several species whose breeding range extends to the Polar regions appear in considerable numbers on our shores on their way to the far north; a few appear even still later. The chief among these late birds of passage are the grey plover and the knot, and less numerously or less frequently the snow-bunting, widgeon, barnacle goose, 'grey geese,' swans, the dotterel, turnstone, sanderling, ruff, bar-tailed godwit, whimbrel, and a few great northern divers. (¹)

"In connection with the spring immigration it has to be remarked that the observations are all in favour of the theory that the earliest arrivals among the summer visitors to our islands are British-breeding birds. This is borne out by the fact, well-known to all field-naturalists, that our summer birds appear in their *breeding haunts* in our islands *immediately* after their first appearance on our coasts in the spring. Additional proof is furnished by the fact that summer birds arrive in Britain at earlier dates than in Heligoland, where nearly all the species observed are *en route* for more northern lands than ours. The further fact already mentioned, that down to the end of May, and in some instances the first half of June, large numbers of birds of species which are summer visitants to Britain arrive on and pass along our coast as birds of passage, proves that the migrants bound for the north are the last of their kind to appear in the British area.

"*Spring Emigration*.—The spring emigration from the British Isles to continental Europe sets in on the part of certain species early in the year, indeed before the winter emigratory movements have ceased to take place. Thus in February, in some seasons, 'geese' are recorded as moving northwards in considerable numbers. . . . During March these south-easterly movements become more pronounced, and the emigrants include the hooded crow, rook and skylark. Emigration for the north also commences, and the following winter visitors are recorded as leaving our islands during the month: great grey shrike, shore lark, swans, 'wild geese,' gadwall, scaup, golden-eye, long-tailed duck, red-throated diver, and probably many others. In March, too, certain species (greenfinch, chaffinch, twite) which regularly seek the islands off the west coast of Ireland as winter retreats are mentioned as taking their departure for the summer. The mild spells of April induce a considerable amount of emigration for their northern summer haunts on the part of no less than thirty-four species. . . . May is a month of much emigration on the part both of birds which have wintered in our islands, and of birds of passage (including many individuals of species which are summer visitors to Britain). In all, no less than fifty-three species of regular emigrants are recorded in the May returns, showing that the movements to the northern breeding-grounds reach their maximum during this month, and often take the form of 'rushes' after the birds have been held back by spells of ungenial weather. The northward movements from our shores of a few species whose breeding range lies within the Polar regions are also observed down to the middle of June, or even beyond that date, and have already been noticed. The departure for their northern summer

(¹) The fact that these birds, or most of them, should *arrive on our shores* as birds of passage thus late in the migratory season lends some countenance to the theory that the birds of certain species going farthest north in summer go the farthest south for winter quarters.

quarters of the spring birds of passage and of the winter visitors to Britain takes place from our eastern coasts and the northern isles; a few only of the species, such as the redwing, wheatear, white wagtail, barnacle goose, swans, whimbrel, etc., passing up our western coasts, possibly *en route* for Iceland.

METEOROLOGICAL.

"Special attention has been bestowed upon this section of the Digest, since the actual relationships between migrational and meteorological phenomena have not hitherto received the attention they deserve, no doubt because the necessary sets of data for a satisfactory investigation of the problem were not obtainable. The material collected by the Committee has proved in all respects most valuable for establishing a useful comparison between these two sets of phenomena, and for determining, to a certain extent, the precise influence exercised by the weather upon bird movements. The standard for the weather has been the 'Daily Weather Reports' issued by the Meteorological Office. . . . It may be well to state that these 'Daily Reports' are based upon observations made at fifty-four stations, distributed over Western Europe between Haparanda and Bodö in the north, and Toulon, Biarritz and Corunna in the south; as well as all parts of Great Britain and Ireland.

. . . . . .

"The weather influences are of two kinds, as treated of separately below:

"I.—*Ordinary Weather Influences.*—It is found that both in the spring and autumn migratory periods there are spells of genial weather without marked features other than those favourable for migration. During these the movements of the various species are of an even-flowing and continuous nature. If the weather should prove slightly unsettled during such periods, it is a matter of indifference to the migrants; if more pronouncedly so, their movements are slightly quickened thereby. This may be termed normal migration under ordinary weather conditions. The duration of such favourable spells, however, is sooner or later broken by the advent of a cyclonic period of a more or less severe type. This interferes, to a greater or lesser degree, with the progress of the migratory movements.

"II.—*Extraordinary Weather Influences.*—These are exerted by the prevalence of particular weather conditions, which may act either (1) as barriers to the ordinary movements, or (2) in diametrically the opposite direction, as incentives to great movements or 'rushes,' as they have been termed. . . . The weather incentives to migration are widely different in their nature, and may take several forms. First, there may be favourable weather periods immediately following unfavourable periods. Secondly, they may be due to weather in certain respects unfavourable to the birds, such as a decided fall in temperature, which either compels the birds to move, or acts as a warning that the time has arrived for their departure southwards. Such cold spells are characteristic of anticyclonic periods, when the weather is calm and highly favourable for a prolonged flight. Thirdly, and on the other hand, the advent in spring of a genial spell, especially if accompanied by a rise of temperature, is an incentive to a move to the northward for the summer haunts. The weather influences thus vary considerably; but temperature plays the most important part in the various seasonal movements, and is the main controlling factor in all extraordinary movements, other meteorological conditions being suitable. Each movement, however, has its peculiarity, and the conditions controlling it are often due to meteorological phenomena of a more or less complex nature, most of which, perhaps, admit of explanation.

. . . . . .

"*Winds.*—The importance attached to winds in connection with bird-migration has hitherto been much over-estimated by popular writers, and their influence, such as it is, misunderstood. The conclusions to be drawn from a careful study of the subject are: (1) that the *direction* of the wind has no influence whatever *as an incentive to migration;* but that (2) its *force* is certainly an important factor, inasmuch as it may make migration an impossibility, arrest to a greater or lesser degree its progress, or even blow birds out of their course. We have the clearest proof, indeed, that birds do not emigrate when the winds are exceptionally high, though they sometimes pass into high winds and gales when *en route*, under the meteorological conditions which have already been described and explained. Ordinary winds—that is, winds not too strong—appear to be of small concern to the birds, for they are recorded as migrating with winds blowing from all quarters. It is, however, a fact that particular winds almost invariably prevail during the great autumnal movements, and these have hitherto been considered by some as the direct incentives to such migrations. Such is not the case, and it may be at once stated that these supposed favourable breezes are simply another direct result of the pressure distribution favourable to the movements. This peculiar type of weather has already been fully described and its effects discussed; the winds prevailing and dependent upon these barometric conditions are easterly, chiefly south-easterly, breezes. There is really no reason why westerly (west, north-west, and south-west) winds, not too strong, of course, should not, *other things being equal*, be in every way as suitable for migratory movements as those varying between such divergent points as north-east to south. When, however, we come to inquire into the meteorological conditions producing these westerly winds, the reason for their unsuitability becomes at once apparent. These winds are the result of types of pressure-distribution which are fatal to migration between north-western Europe and Britain, namely, the presence of cyclonic areas to the north-east or east of the British Isles. This means that the area under disturbed conditions would be the very region from which we derive our autumn immigrants and render emigration from such sources impossible. Such areas of disturbance, with their high westerly and north-westerly winds, indeed, often extend to and influence the weather in our islands, and interfere with the British emigratory movements in both autumn and spring. Strong winds have a curious effect on the flight of gulls, compelling them to move in a direction more or less directly heading the wind. Thus a strong westerly wind causes great numbers of gulls to seek the estuaries and bays of our east coast. On the other hand, strong easterly winds will fill the estuaries and sea-lochs of the west coast with these birds. The lee side of islands is also sought under similar conditions of the wind. A south-easterly wind, for the same reason, causes considerable numbers of gulls of various species to pass southward along the eastern coast of Britain. Large parties of gulls are also recorded as passing north — sometimes for a whole day — with a north-north-west wind. These movements are

more or less local, and the birds return, no doubt, to their regular haunts in a few hours' time. They are, moreover, chiefly observed in the autumn.

"*Gales.*—One effect of gales has already been alluded to, namely, that they arrest or make impossible the migratory movements. At sea, however, they have a direct influence on the migrations of certain marine species, such as skuas, phalaropes, petrels, etc. These birds in the autumn are occasionally driven out of their course by severe gales, and appear on our coasts in exceptional numbers.

"*Fog.*—It often happens that during an important migratory movement in the autumn or winter, fog prevails. On such occasions more birds than usual approach the lanterns of the light-stations and are killed, sometimes in considerable numbers, by striking against the glass. This phenomenon is another effect of those anticyclonic spells which have been mentioned as favourable to and causing emigration, and it is thus not surprising that the birds should encounter foggy weather during their movements. Such atmospheric conditions are well-known to meteorologists to be characteristic of these high-pressure systems, and of their frosty periods, which latter are also the chief cause of the winter movements. There is also some direct evidence that birds lose themselves in foggy weather, since practically non-migratory species, such as sparrows, appear during its prevalence at unusual seasons at stations just off the coast."

Although it has been necessary to quote largely from the foregoing report, still the fringe, as it were, of the subject only has been reached. So much more valuable information will be found there that no person interested in bird migration should fail to read the whole, and attentively study the conclusions arrived at by the committee.

## ARMATURE OF HELICOID LANDSHELLS.

### With a New Species of Plectopylis.

By G. K. Gude, F.Z.S.

(*Continued from page* 301.)

*Plectopylis clathratuloides* ([1]) (fig. 44*a*-*d*). Colonel Beddome has kindly lent me for examination a number of shells of *Plectopylis*, from the Anamullay Hills, which appear to be unde-

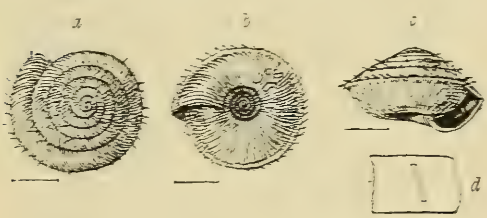



Fig. 44.—*Plectopylis clathratuloides.*

scribed, and for which I adopt the name of *Plectopylis clathratuloides*, suggested by Colonel Beddome. It is possible, however, that this form already exists in some collections under the name of *P. clathratula*; for, as already mentioned in discussing that species, I believe the specimens referred to under that name in Mr. Nevill's Hand List as from Sikkim belong to this new form. *Plectopylis clathratuloides* differs from *P. clathratula* in being more elevated, in having a narrower umbilicus, and in being less shining and more tumid below, while it differs from *P. retifera* in being less elevated and in having a wider umbilicus; it is, in fact, intermediate between those two species. The parietal armature consists of a simple, strong, vertical plate, which is not notched, and is without supports (see fig. 44*d*). The palatal armature is in two series, the first (upper) series consisting of a posterior vertical tooth and a minute anterior denticle; the second (lower) series being composed of a posterior vertical tooth and a small anterior denticle; below the umbilical angulation there is, besides, an elongated horizontal fold, and above the peripherial angulation a small fold (see fig. 44*b*, which shows the base of the shell with the palatal armature visible through the shell-wall). The specimen figured is one of the Anamullay Hills specimens belonging to Colonel Beddome's collection. Six specimens from Madura, India, also in Colonel Beddome's collection, I refer to this new form; four of these are immature and exhibit two sets of armatures, as is the case in immature specimens of *P. retifera*.

Mr. E. R. Sykes and others have drawn my attention to the fact that the name *Austenia*, proposed by me for a section of *Plectopylis* (*ante* p. 300) is preoccupied. Under these circumstances it is necessary to re-name the section, and I therefore propose the name *Sykesia*, in honour of Mr. Sykes, who was the first to point out this fact.

([1]) *Plectopylis clathratuloides*, n.sp.—Shell depressed conical, moderately umbilicated, pale corneous, translucent, finely and regularly plicated by raised ribs above, finely and closely ribbed and a little shining below; whorls 5½, slowly increasing, slightly convex, suture impressed. Periphery with an acute compressed keel, above which revolve 2 raised spiral ridges, the lower provided with a fringe of coarse hairs. Aperture subquadrate; peristome simple, a little thickened. Umbilicus deep and moderately wide. Parietal armature, one strong, vertical, simple plate. Palatal armature in two series; upper series with one posterior, vertical, conical tooth and one minute anterior denticle; lower series, with one posterior, vertical tooth and a small anterior denticle; in addition, one elongated horizontal fold below the umbilical angulation and a small fold above the peripherial angulation. Major diameter, 6 millimetres; minor diameter, 5·5 millimetres; axis, 3·5 millimetres.—Habitat, Anamullay Hills, India.—Type in Colonel Beddome's collection.

# ARTESIAN WELLS:

By W. V. Ball, B.A., F.G.S.

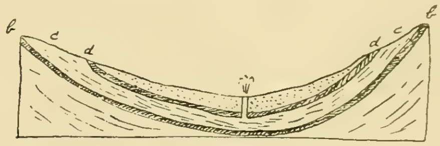
WHEN passing through Trafalgar Square one is often astonished at the immense quantity of water which must daily run to waste from the two beautiful fountains which are constantly playing, and one sometimes comments on the apparently reckless extravagance of the municipal authorities in permitting such waste. The beauty of these two fountains is greatly enhanced by the fact that they are entirely independent of any grimy pumping-engine for that which gives them life.

The water, which comes from a depth of 400 feet below Charing Cross, is brought to the surface, at considerable pressure, from an Artesian well, and, as will be shortly explained, we have to thank nature alone for the supply to these ornaments to our great city.

The name "Artesian," as applied to wells, is derived from Artois, one of the French provinces where they exist and are made use of in large numbers. They have been known for a very long time, having been found in China and in the Libyan Desert in the twelfth century. The distinction between an ordinary well and an Artesian well is that whereas the former only brings water to the surface of the ground, and in some cases is only able to bring it to a point some distance below the surface, from which it has to be pumped, the water is brought up by an Artesian well at appreciable pressure, so that it can be conducted in pipes to a considerable height, and be used for supplying fountains, or for ordinary domestic purposes. It is, therefore, obvious that the existence of an Artesian well is due to some very special arrangement of the underlying rocks, and it is only a study of the geological structure of a district that will serve to explain their origin.

It is well known that different "rocks," in the geological sense, are permeable to water in various degrees. Thus, chalk is not only permeable, but is capable of soaking up large quantities of water like a sponge, while a stiff clay entirely prevents the passage of water through the strata. Consider for a moment a district in which the rocks consist of a basin-shaped series of strata, sloping towards a central point or line. Then, as shown in the accompanying diagram, the newest rocks will be in the centre, and towards the outside the older rocks will come in succession. Suppose that a permeable stratum (*c*) on the outside of this basin underlies an impermeable stratum (*d*) and overlies another impermeable stratum. Where the permeable stratum comes to the surface, it absorbs the rain-water, which, on penetrating through to the impervious rock underneath, follows the general inclination of the basin and runs towards the central point, where it gradually collects. After it has accumulated so as to fill the chalk or other pervious rock to saturation, it is prevented from rising any higher at the central point by the overlying impervious rock (*d*). In consequence of this the level of the water rises in the pervious rock which forms the sides of the basin, and ultimately rises higher than the level of the bottom of the basin at the surface. Then, as soon as a hole is bored through the bed (*d*) to the pervious and saturated chalk, the water will rise not only to the surface, but far above it, if pipes are laid to conduct it. The height to which the water will rise is of course regulated by the rainfall, not of the place in which the Artesian well is sunk, but of the districts where the permeable strata crop out at the surface.

The theoretical conditions which have just been explained are closely analogous to those which account for the Artesian wells in the London basin, of which Trafalgar Square, roughly speaking,




Geological Formation for Artesian Well.

forms the central point. The London clay represents the overlying impervious stratum, and it is through this that the well is bored to a depth of 400 feet. The chalk, which is porous and acts as a sponge, underlies the London clay, and crops out in Hertfordshire to the north and in Surrey to the south of London, while the stiff blue clay known as the gault forms the lowest layer of the basin, and prevents the water from penetrating further into the earth. The pressure of the water in Trafalgar Square therefore varies according as the season is dry or wet in Hertfordshire and Surrey. Thus these fountains, and, indeed, many of the Government buildings at Westminster, are supplied with water, not from any artificial reservoir, but from one which has been constructed, and is constantly replenished, by nature herself.

Artesian wells are quite common in France, as indeed they always are wherever the geological conditions are favourable. Paris at the present day is to a large extent supplied by them, and the water comes in some cases from so great a depth that it is quite warm when it reaches the surface. This is of interest to geologists, as showing that the temperature of the earth increases with the depth.

*Cambridge; April*, 1897.

## BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

*Natural History of the Marketable Marine Fishes of the British Islands.* By J. T. Cunningham, M.A., with a Preface by Professor E. Ray Lankester, M.A., LL.D., F.R.S. 375 pp. royal 8vo, illustrated by 159 figures and 2 coloured maps. (London and New York: Macmillan and Co., Limited, 1896.) Price 7s. 6d.

Although there are numerous "natural histories" of British fishes, not one is quite like this most useful work on our marine food fishes. It was issued under the auspices of the Marine Biological Association, as explained in the Preface by the President of the Association, Professor Lankester, the author being one of the scientific staff of the institution. He has devoted much attention to the life-histories of marine fishes, not only at the Plymouth Laboratory but also in others at Granton, Cleethorpes, and elsewhere. We have not to read far into the pages of this work before we find a natural history of far more intelligent character and scientific nature

Fig. 59.

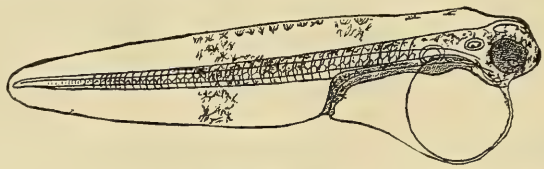


Fig. 60.

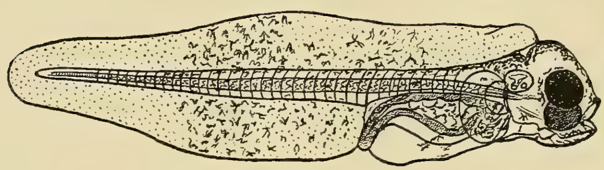


Fig. 61.

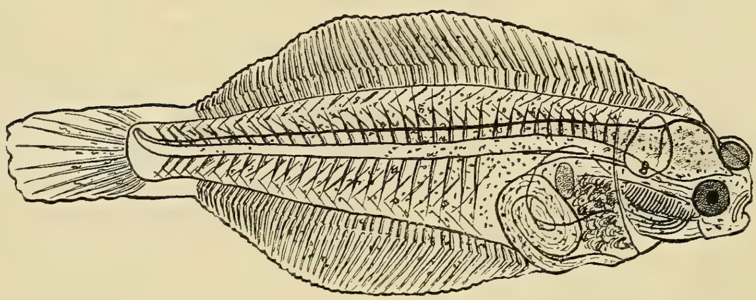
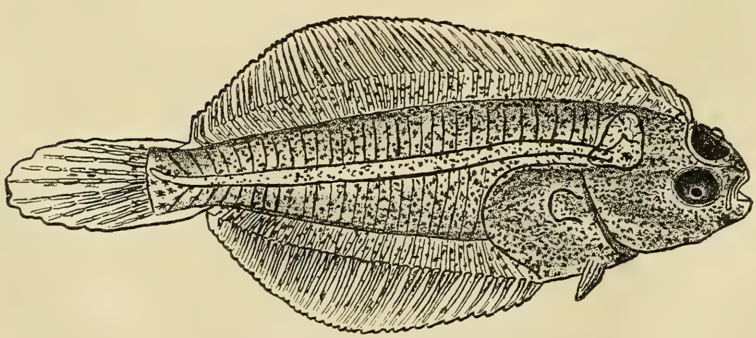


Fig. 62.



Transformation of Flounder.

*(From Cunningham's "Marketable Marine Fishes.")*

Figs. 59-62, four stages in the transformation of the flounder. Fig. 59, the larva ($\frac{15}{100}$ inch in length), two days after hatching, the yolk not yet all absorbed; fig. 60, the same, six days after hatching, the yolk all absorbed and the mouth open ($\frac{16}{100}$ inch in length); fig. 61, specimen in a transition stage, with the left eye near the edge of the head (length, $\frac{40}{100}$ inch); fig. 62, specimen in which the transformation is nearly complete, the left eye on the edge of the head (same length).

than most of the older ones hitherto published. This is to be attributed to the more exact study of these animals during the last decade, especially in regard to embryology, in consequence of the work done in the numerous marine biological stations now established in various parts of Europe and America. In Chapter i. of this work, Mr. Cunningham reviews the modern investigations of the subject. This chapter will be found to contain some thirty pages of great interest, carrying us over the work done from 1862 down to the close of last year. Not the least of this is to be traced to the patient investigations of the science staff of the British Marine Biological Association at Plymouth and elsewhere. When we remember the crude manner of the so-called scientific work of investigation into the natural history of marine fishes in the early sixties, and what we may call the "Buckland" period, we find the value of the modern systematized research which has lifted the old natural history into several exact sciences. We think of the different types of knowledge between the two periods as we remember the fact that the popular Commissioner of Fisheries of the early period on being shown some living herrings in a tank at Rothsay, exclaimed, "Those are no herrings, they haven't red gills." The general plan of the book before us is based upon the latest information gathered by the author from personal experience and that of other modern investigators; the former source being by no means the least valuable. The treatment of the subjects discussed is so simple and plain that we may call it "popular" in the best sense; for it may be understood by the least initiated readers. The illustrations are generally well drawn and carefully selected to explain what is intended. The drawings are by no means stinted in number, and are largely original, so containing many subjects which have not been hitherto shown in English works on fishes. Through the courtesy of Messrs. Macmillan we are enabled to give examples which show the modern character of the work. We cannot too strongly recommend this excellent book to our readers, who will find ample information and satisfaction for the comparatively low price for so handsome a volume. We also venture to congratulate the executive of the Marine Biological Association for the initiative in issuing a work which cannot fail to be of real value to the community at large.

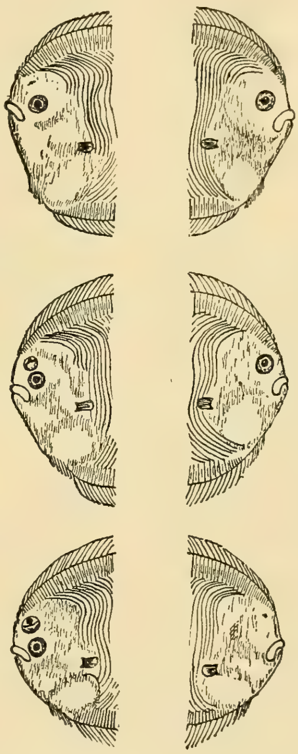


Fig. 100. Fig 101.

Fig. 102. Fig. 103.

Fig. 104. Fig. 105.

TRANSFORMATION OF FLAT-FISH.

*(From Cunningham's "Marketable Marine Fishes.")*

Figs. 100-105.—The two sides of the head in three different stages in a left-sided young flat-fish, in which the right eye passes through the head region to reach the left side (*Rhomboidichthys*). The two upper figures show an eye on each side of the head, but the right eye is higher in position. In the middle figures the right eye is beginning to appear on the left side through a slit above the left eye. In the third figures the passage of the right eye is very nearly completed. (After Steenstrup.)

*The Flora of the Alps*. By ALFRED W. BENNETT, M.A., B.Sc., F.L.S. 8vo. Vol. i, Part 1. With 15 coloured plates. (London: John C. Nimmo, 1897.) Price 2s. 6d. net.

This work will be most welcome and useful to amateur botanists and others visiting the Alpine regions of Central and Western Europe. It is to be issued in eight monthly parts, and when complete will make two handsome volumes, illustrated by 120 coloured plates. It is a guarantee that the work will be trustworthy when we see Mr. Bennett's name as responsible for the letterpress. In dealing with the species, the plan is to notice, at least by name, every flowering plant occurring in the Swiss, French, Italian and Austrian Alps, also in the Pyrenees. In each case some description is given, and one or more coloured plates for the natural orders. It has been arranged that the last part shall contain an index of Latin and English names, with a glossary of unfamiliar terms, for the general reader who has not been especially trained in botany. The primary object of the two volumes will be "to provide the tourist with a handbook by which he can recognize the plants which are likely to attract his attention in his Alpine wanderings." Now that it is the custom for various touring clubs, educational centres and excursion agencies to send over parties to Alpine Europe every season, such a book as this cannot be too widely known; for every party should carry at least one copy. With the aid of the coloured plates there will not be much difficulty in gaining considerable knowledge of the flowers which in Alpine regions are so abundant in summer time. The parts of this work are not to be sold separately, but by subscription for the whole book.

*Natural History in Shakespeare's Time*. By H. M. SEAGER, M.B., etc. 364 pp. large 8vo, illustrated. (London: Elliot Stock, 1896.) Price 8s. 6d.

On looking over the pages of this admirable compilation, one is struck by the immense difference between the knowledge of "natural history" of our own times and those sources from which Shakespeare could have drawn his information

had he depended on books rather than his own acute observation. Of course, the condition of ignorance, inaccuracy and misrepresentation which existed in the time of the greatest of poet-dramatists extended far forward towards our own days. Neither can we claim that it has all disappeared, even though we pride ourselves on the modern advance of natural science investigations. Mr. Seager has used much discretion in his selection of quotations, though the sources of his research are limited. The books which he quotes number about a dozen, and certainly form as quaint a collection of ignorant teachers as could well be brought together. Their dates of publication range from the end of the fifteenth century to the first quarter of the seventeenth century. Mr. Seager has arranged the subjects alphabetically, and usually gives quotations from the old authors without comment, beyond a reference as to where they are to be found. Such comments as he makes upon the application of the words by Shakespeare are well considered and often useful. The following are examples of the quotations presented in the work before us :

"CUCKOO.—'A Midsummer Night's Dream,' iii, 1, 134. 'The cuckoo is a dishonest bird, and is very slow, and does not stay in a place. In winter it is said to lose its feathers ; and it enters a hole in the earth or hollow trees ; there, in the summer, it lays up that on which it lives in the winter. They have their own time of coming, and are borne upon the wings of kites because of their short and small flight, lest they be tired in the long tracts of air and die. From their spittle grasshoppers are produced. In the winter it lies languishing and unfeathered, and looks like an owl.' ('Hortus Sanitatis,' bk. iii, ch. xxxix.) 'If you mark where your right foot doth stand at the first time that you do hear the cuckoo, and then grave or take up the earth under the same, wheresoever the same is sprinkled about there will fleas breed. And I know it hath proved true.' (*Lupton*: 'A Thousand Notable Things,' bk. iii, § 47.)"

"EEL.—'Love's Labour Lost,' i, 2, 30. 'The eel is generated from the slime of other fishes; it is hard to skin, and very difficult to kill, as it lives even after it is skinned; it is disturbed by the sound of thunder. It is most easily caught when the Pleiades have set. And they say that in the eastern River Ganges eels are gendered with feet to walk on the land. Eels live for eight years, and they exist without water for six days while north-east wind blows, but less while the south wind blows. Among eels there is no male nor female, and they gender neither live creature nor egg, as they are neuter.' ('Hortus Sanitatis,' bk. iv, § 2.)"

Though much of what appears in the quotations in this book now seems absurd, we would undertake to find many people still living who believe such statements. Indeed, among enlightened persons it was only within the present "nineties" that they learned the truth about the life-history of young eels. We must congratulate Mr. Seager upon making so interesting a book, which will afford amusement to everyone who dips into its pages, whether science student or layman. The old and quaint wood-blocks selected for illustration are hardly more wonderfully misleading from an educational point of view than the letterpress which accompanies them. The publisher has produced a handsome volume, one suitable to every library.

*British Game Birds and Wild Fowl.* By BEVERLEY R. MORRIS, M.D. Revised by W. B. TEGETMIER, F.Z.S. (London: John C. Nimmo, 1897.) In twelve monthly parts. Super royal 8vo. Price 2s. 6d. per part, net.

This work, which was first issued in 1855, has been revised and brought up to date by Mr. Tegetmier, the well-known contributor of articles on certain ornithological groups, game birds among others. Not only has he renovated the letterpress for this new edition, but also the plates have been overhauled, and in some instances corrected. It is difficult to judge to what extent the work has been rewritten, as there is not anything to indicate the new from the old. In the part before us much of the matter is up to date; so it may be concluded that a large portion of it is new. This should be considered chiefly as a sportsman's book, as there is no pretence of its being of a scientific character. When complete there are to be sixty large coloured plates and 382 pages of printed matter.

*Annual Report of Smithsonian Institution.* (To July, 1894.) Pp. xl. and 770, 8vo, illustrated by 70 plates, photographs and drawings. (Washington: Government Printing Office, 1896.)

This handsome volume is fully up to the usual excellence of the Smithsonian Reports, which contain not only particulars of the national scientific institution of the United States of America, but also a selection of important papers published elsewhere. The former section in this volume occupies eighty-three pages, whilst the latter appear in a "General Appendix" of 626 pages.

*South London Natural History Society: Abstract of Proceedings for* 1896. 131 pp. 8vo. (London: The Society, Hibernia Chambers, S.E., 1897.) Price 2s. 6d.

The South London Entomological and Natural History Society has reason to thank a few of its members for the personal and financial aid given in producing these "Transactions," which by the balance sheet we see cost £28, out of which £15 15s. is paid for by donations. The Society is in a prosperous condition, and possesses a substantial balance in its favour. The "Transactions" before us form an exceptionally interesting volume, containing much original observation and several papers of value.

*Some Unrecognized Laws of Nature.* By IGNATIUS SINGER and LEWIS H. BERHENS. 483 pp. large 8vo, illustrated by 67 figures. (London: John Murray, 1897.) Price 18s.

This important work deals with the consideration by the authors of a number of recognized physical phenomena which have been independently explored by them. The work represents an immense amount of thoughtful labour, which cannot fail to command the respect of the readers of the book, even if in all cases they do not agree fully with the deductions and interpretations. The plan is to divide it into four sections, which deal with (1) Methods of Enquiry; (2) First Principles; (3) Phenomenology, or the Interconvertibility of Forces; (4) Gravitation. We must leave to those of our readers who care to study the various subjects the formation of their own opinions on the theories, remarkable in some instances, propounded by the authors. There can be no doubt of the magnitude of the task undertaken by them, which amounts to converting modern physicists from some very firmly-established theories.


CONDUCTED BY FRANK C. DENNETT.

| | May. | Rises. h.m. | Sets. h.m. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Sun* | 7 | 4.22 a.m. | 7.30 p.m. | 2.59 | 16° 58′ N. |
| | 17 | 4.7 | 7.46 | 3.38 | 19° 27′ |
| | 27 | 3.55 | 7.59 | 4.18 | 21° 23′ |
| | | *Rises.* | *Souths.* | *Sets.* | |
| *Moon* | 7 | 7.58 a.m. | 4.31 p.m. | 0 20 a.m. | |
| | 17 | 9.55 p.m. | 0.18 a.m. | 3 56 | |
| | 27 | 1.41 a.m. | 8.49 | 4.13 p.m. | |

| | May. | Souths. h. m. | Semi Diameter. | Position at Noon. R.A. h.m. | Dec. |
|---|---|---|---|---|---|
| *Mercury* | 7 | 1.5 p.m. | 5″ 0 | 4.5 | 23° 4′ N. |
| | 17 | 0.20 | 5″ 9 | 4.2 | 20° 26′ |
| | 27 | 11.21 a.m. | 5″ 9 | 3.43 | 16° 42′ |
| *Venus* | 7 | 10.59 | 28″ 2 | 2 56 | 15° 47′ N. |
| | 17 | 10.11 | 25″ 0 | 1.53 | 12° 33′ |
| | 27 | 9.38 | 21″ 3 | 1.59 | 11° 7′ |
| *Mars* | 7 | 4.42 p.m. | 2″ 6 | 7.44 | 23° 2′ N. |
| | 17 | 4.26 | 2″ 5 | 8.8 | 21° 51′ |
| | 27 | 4.10 | 2″ 4 | 8.31 | 20° 28′ |
| *Jupiter* | 17 | 6.31 | 17″ 4 | 10.14 | 12° 17′ N. |
| *Saturn* | 17 | 11.59 | 8″ 6 | 15.43 | 17° 24′ S. |
| *Uranus* | 17 | 11.55 | 1″ 9 | 15.39 | 19° 17′ S. |
| *Neptune* | 17 | 1.31 | 1″ 2 | 5.13 | 21° 41′ N. |

MOON'S PHASES.

| | | h.m. | | | h.m. |
|---|---|---|---|---|---|
| *New* | May 1 | 8.46 p.m. | *1st Qr.* | May 9 | 9.37 p.m. |
| *Full* | „ 16 | 1.54 „ | *3rd Qr.* | „ 23 | 9.34 a.m. |
| *New* | „ 31 | 0.26 „ | | | |

SUN.—Spots are of considerable frequence upon the disc, some being of great interest from their rapid changes.

MERCURY is in splendid position for observation at the commencement of May, not setting on the 1st until 2h. 10m. after the sun. On the 3rd, at about 9 p.m., it may be found a little to the south-west of the crescent moon. It rapidly nears the sun, being in inferior conjunction on the 21st at 7 a.m.

VENUS is a morning star, which may be observed a little before sunrise in the latter part of the month as a very narrow crescent.

MARS is now an insignificant object, setting a little after midnight during the entire month, approaching near δ Cancri, 4th-magnitude, on the 31st.

JUPITER is near Regulus all the month, being on the meridian about 7.30 p.m. at the beginning of the month, and setting about 2.45 a.m. At the end of the month he sets just before midnight.

SATURN rises about 8.33 p.m. on the 1st and about 6.30 on the 31st. About 5 a.m. on the 18th, Saturn is in opposition, so that during this month the planet is at its best. A very small telescope will show its largest satellite, Titan. The rings now present a magnificent spectacle. On May 25th the outer ring has its greatest apparent diameter, 43″·05, and its least, 17″·43, the polar diameter of the planet being 17″·2. The whole month it remains near to β Scorpii.

URANUS is at its best for this year, coming into opposition on May 17th, at 6 p.m., just eleven hours earlier than Saturn, but its low altitude in this country is much against successful observation.

NEPTUNE is too close to the sun to be observed.

METEORS may be looked out for specially on May 2nd, 4th, 15th, and 31st.

VARIABLE STARS in good position during May and June are :—

| | R.A. h.m. | Dec. | Magnitude. Max. | Min. | Period. |
|---|---|---|---|---|---|
| S Coronæ Bor. | 15.16 | 31° 50′ N. | 6·5 | 11·8 | |
| R „ „ | 15.43 | 28° 33′ N. | 6·0 | 13·0 | |
| 30 g. Herculis | 16.24 | 42° 10′ N. | 4·9 | 6 2 | 413d. |
| S „ | 16.45 | 15° 9′ N. | 6·3 | 12·5 | 301·0d. |
| α „ | 17.8 | 14° 32′ N. | 3·1 | 3·9 | Var. Mn., 102d. |
| δ Libræ ...... | 14.54 | 8° 0′ S. | 4·9 | 6·0 | 2d. 7h. 51m. |
| χ Sagittarii ... | 17.38 | 27° 46′ S. | 4·0 | 6·0 | 7d. 0h. 25m. |
| W „ ... | 17.55 | 29° 35′ S. | 5·0 | 6·5 | 7d. 14h. 8m. |
| R Serpentis... | 15.44 | 15° 31′ N. | 5·7 | <11·0 | 356·0d. |
| η Cygni ...... | 19.52 | 34° 45′ N. | 3·0 | 6·7 | |

This brings our list of variable stars to a close. In the new volume we intend giving monthly a short list of those remarkable objects known as red stars.

A NEW OBSERVATORY FOR LONDON.—At the meeting of the British Astronomical Association on March 31st, Mr. E. W. Maunder announced that on that afternoon the Council had accepted the generous offer of a site for an observatory by the Royal Botanical Society. The spot offered is situated in the grounds of that Society in Regent's Park, and is to be held at a pepper-corn rent. A committee was appointed to carry out the negotiations. The Park is a good place for an observatory, from the large amount of sky room which it offers. Furthermore, it was in Regent's Park that Mr. George Bishop's observatory stood, with its seven-inch Dollond equatoreal. The late Dr. J. R. Hind became assistant in 1844, and succeeded in here discovering ten of the minor planets, another being found by Herr Marth.

JUPITER'S BELTS.—At the same meeting two papers by Rev. W. R. Waugh were read, dealing with the aspect of the planet this season, and pointing out particularly the increase of width and activity in the north equatorial belt. The south equatorial belt is becoming more of a brick-red colour, almost as intense as the great red spot was when at its best. That object has now faded so much that only its *following* end can be observed with telescopes of moderate aperture. It is not only the changes in contour of the markings which are a mystery, but also the changes in colour.

THE GREAT NEBULA IN ORION.—The April number of "Knowledge" contains a plate of the photograph of this wonderful object, taken by Dr. Isaac Roberts with his great reflector after a double exposure given on two nights, making a total of seven hours. In the accompanying note the doctor raises a question as to the benefit to be derived from any longer exposure of the photographic plate. The marvellous curdled appearance of the nebula is well brought out in the photograph, and which the late Sir John Herschel described as looking like "a curdling liquid, or a surface strewed over with flocks of wool, or the breaking up of a mackerel sky."

MARS.—During the past opposition, last December, Professor Schur, using the Repsold heliometer, measured the planet with great care. The equatorial diameter varied from 6·210″ to 6·310″, and the polar diameter from 6·125″ to 6·135″.

## SCIENCE GOSSIP

Mr. W. F. de V. Kane, M.A., F.E.S., reports the capture in County Cork of a moth rare in Europe (*Leucania unipuncta*, Haw.). This is the second time it has been taken in Ireland. It is an abundant species in America, where it is known as the army-worm, and one of the worst enemies of the cotton and other crops.

The new number of the "Journal of the Marine Biological Association of the United Kingdom" contains several articles of importance, including one upon a new British crab, by Mr. Walter Garstang. This is *Portumnus nasutus*, Latr., found by the author at Drakes Island. It may be overlooked as an abnormal young shore-crab (*Carcinus mænas*), which it somewhat resembles.

In his report of February last, just issued by the Director of the Marine Biological Association, Mr. Allen reminds us that though the United States Government allows the Commission of Fish and Fisheries no less than £35,000 for annual salaries alone, the total income of the Biological Association of this country hardly reaches £2,000 a year.

We fear this will be so with the Marine Biological Association until it gets into closer touch with popular opinion in this country. At present, to give a piscatorial proverb, it is rather "caviare to the multitude," or, we should say, to that portion of the multidude who have heard of its existence

An important paper was read by Mr. A. B. MacDowall before the Royal Meteorological Society in London, on April 21st, upon "Suggestions of Sunspot Influence on the Weather of Western Europe." The author believes that there is a tendency to greater heat in the summer half year and to greater cold in the winter half year near the phases of the minimum sunspots than near the phases of maximum; the contrast between the cold and heat of the year thus tending to be intensified about the time of minimum sunspots.

The following are the Lecture arrangements after Easter at the Royal Institution:—Dr. Tempest Anderson, four lectures on "Volcanoes" (The Tyndall Lectures); Dr. Ernest H. Starling, three lectures on "The Heart and its Work"; the Rev. Canon Ainger, four lectures on "Some Leaders in the Poetic Revival of 1760–1820—Cowper, Burns, Wordsworth, Scott"; Professor Dewar, three lectures on "Liquid Air as an Agent of Research"; the Rev. J. P. Mahaffy, three lectures on "The Greek Theatre according to Recent Discoveries"; Mr. J. A. Fuller Maitland, four lectures on "Music in England during the Reign of Queen Victoria" (with musical illustrations). The Friday evening meetings will be resumed on April 30th, when a discourse will be given by Professor J. J. Thomson, on "Cathode Rays"; succeeding discourses will probably be given by "Anthony Hope," Professor Harold Dixon, The Right Hon. Lord Kelvin, Professor H. Moissan, Mr. W. H. Preece, Mr. William Crookes, and other gentlemen.

Geheimrath Wilhelm Döllen, formerly of the Russian observatories of Dorpat and Pulkowa, has passed away.

Kites are being used at Blue Hill Observatory, Massachusetts, for obtaining meteorological records in the upper air. These kites have been flown at an altitude of 8,740 feet above Blue Hill. They are controlled by a steam winch and fine wire cords. Several hundred successful "flights" have been obtained, with much valuable data from automatic instruments for taking the necessary observations in humidity, changes of temperature, and wind strength.

America has lost one of its leading biologists in Professor Edward Drinker Cope, who died on April 12th last, aged 59. Few men of science have left behind a more vivid impression of their usefulness than has Professor Cope. He was a man of wide experience as a palæontologist and authority on living vertebrata. As an original thinker he was independent and bold, but always commanded the respect of both disciples and opponents.

Why is the herbarium at the Folkestone Free Museum practically inaccessible to the visitors? We recently desired to compare a specimen for identification, but were informed we could not do so without applying for permission to the Hon. Curator of the department elsewhere. Keys of all the other collections are left with the attending curator of the museum. Is it that the Hon. Curator of Botany is ashamed of the contents of the herbarium, or are the plants too valuable for the public gaze?

The Second Annual Congress of the South-Eastern Union of Scientific Societies will be held at Tunbridge Wells on Friday and Saturday, May 21st and 22nd, under the Presidency of the Rev. T. R. R. Stebbing, M.A., F.R.S. The Union now comprises some thirty societies. On May 21st the general meeting will be held at 3 p.m., and a conversazione at 8 p.m. On Saturday 22nd, business will be continued from 9.30 to 1.30, and at 3 p.m. there are to be excursions and a garden party.

We have been favoured with an advance copy of "Wild-Bird Protection and Nesting-Boxes," by Mr. John R. B. Masefield, M.A., a prettily produced little book devoted to the encouragement of the preservation of wild birds. It is illustrated with some reproduced drawings and photographs. The author is enthusiastic on his subject, and has added much upon the growth of the protective laws for birds and a list of County Council orders for their application. It is published by Taylor Bros. of Leeds, and costs five shillings.

There is not any greater incentive for encouragement to the student-collector of any branch of natural history than a well-arranged and clearly-printed label-list for the specimens kept for reference. This has been provided by Mr. H. N. Dixon, M.A., F.L.S., for the British mosses, as a companion to the handbook of those plants which we favourably noticed (*ante* p. 104) in September last. The list is in two forms, one pamphlet-shaped for exchanging and the other in slip form for cutting up for labels. They are published by Mr. V. T. Sumfield, of Eastbourne, and Messrs. Wheldon and Co., 58, Great Queen Street, London; price sixpence each. Micro-botanists will find them most useful. Accompanying these is an alphabetical list of the Genera of British Mosses.

## SCIENCE ABROAD

CONTRIBUTED BY FLORA WINSTONE.

JAHRES-KATALOG PRO 1897 DER WIENER KRYPTOGAMEN-TAUSCHANSTALT. — The Vienna Exchange Office for Cryptogams undertakes to negotiate for its members the exchange and purchase of cryptogams well prepared. Botanists desiring to participate in the exchange must send two lists not later than September 15th (alphabetically arranged within the groups Pteridophytæ, Musci Hepatics, Fungi, Lichenes, Algæ, Characeæ) of those plants which can be furnished until October 15th at latest. All the plants should have a label on white paper, written in Latin or an universal language, as follows: (1) The Latin name of the plant and the author's name; (2) country and locality, most distinctly; (3) date of collection; (4) name of the collector. The address of the Vienna Cryptogammic Exchange Office is 11, Igelgasse, Vienna.

LA NATURALEZA (Madrid, March 28th, April 8th, 1897). Don R. Becerro de Bengoa writes in the number for March 28th, on "Argon and Nitrogen in Arterial and Veinous Blood," giving the proportion of these gases to be found in the blood of an average man. There is also an illustrated unsigned article on "Luminous Plants." The various theories with regard to the cause of this curious phenomenon are clearly stated, and some of the plants described. April 8th.—The Director of the magazine contributes some notes on "Ozone at great heights," giving a list of many places and the relative amount of ozone to be found there. These statements are founded on the observations and experiments of M. M. Thierry at the observatory of Mont Blanc. Don Carlos Banús continues his series of articles, with tables, on the "Lighting Powers" of various substances. There is an illustrated note, unsigned, on a "New Aquatic Velocipede," which has been invented by Sr. Breyer. The machine, when on land, is convertible into an ordinary bicycle.

LA FEUILLE DES JEUNES NATURALISTES (Paris, April 1st). We regret to learn from a note by M. A. Dollfus, that he has lost his mother, Madame Dollfus, who, on the death of her eldest son, the founder of the journal, carried it on for many years, assisted only by M. E. Dollfus. Until her death, she was actively connected with the magazine, and generally contributed the "Book Reviews." M. Eug. Simon commences in this number his series of articles on "The Revision of the Genera of Trochilides," which will apparently run through several numbers. M. H. W. Broelemann completes his series, well illustrated, on "Materials for a Fauna of Myriapoda of France." He describes at length four new species and one new variety of *Julus kervillei* var. *meridionalis*. M. J. Castelnau contributes some "Notes upon *Hyptiotes anceps*," illustrated with a description by Dr. T. Thorell. M. Ernest Malimaud gives an account of new species which have been added to the French flora, a fern (*Botrychium simplex*, Hitchc.), and a lily (*Gagea foliosa*, Rœm. and Sch.). The former, found in the United States for the first time in 1823, has been known in the North of Europe; the latter, in the Mediterranean district. M. G. Mantero reports a new species of *Vipio*, Latr., *Vipio gestroi*. Two illustrations are given.

BULLETIN DE LA SOCIÉTÉ ZOOLOGIQUE DE FRANCE (Paris, February, 1897). M. Edouard Blanc contributes an article "On the Elephants of Northern Africa and Higher Egypt: A Reply to Dr. Trouessart." In the course of his reply to a paper read by Dr. Trouessart at a meeting of the society, M. Blanc discusses the best means of preserving elephants in the above-mentioned regions. He is of opinion that, in addition to restrictions in hunting them, the best means is to give to the living animal a commercial value higher than that of the ivory. Professor Van Bambeke, the Honorary President of the Society, gave an address at the annual general meeting on "The Domain of Zoology." He divides the study of Zoology into two headings—Morphology and Physiology. Taking Morphology as his first subject, he subdivides it into Descriptive Zoology, or the study of the form and exterior characters of the animal; Descriptive Anatomy, or Zootomic, the special study of the organs or interior structure; and the General History, which is the study of the fundamental and simple tissues. M. Van Bambeke impressed on his hearers the necessity for a knowledge of anatomy as well as physiology. He quoted the works of Cruveilhier, the anatomist, that "Without anatomy, physiology is built upon the sand, for physiology is the main point that anatomy explains." M. Henri Gadeau de Kerville contributes "Some Personal Observations on the Extension of the Crest, Wing and Tail, as a means of Defence and Attack among Birds." He puts forth the theory that the crest and other ornaments of the peacock are useful for attack at well as attraction. He instances an attack on a dog, who, though well able to defeat the peacock, is apparently stupified by the imposing appearance of the bird advancing with erected crest and outspread wings and tail. In this opinion M. de Kerville is supported by M. Paul Noel.

BULLETIN DE LA SOCIÉTÉ ROYALE LINNÉENNE DE BRUXELLES (Brussels, March, 1897). M. J. Gachelin writes on "The Lily-of-the-Valley at all Seasons of the Year." He discusses means of keeping this beautiful flower in bloom all the year round. He describes the method employed in America to keep the Lily-of-the-Valley flowering for nine or ten months consecutively. The system appears to be to place the roots in bottles and cover with sand, and then put them in an ice-house. Dr. Nysseus gives an account of the plague of caterpillars which for the last few years have ravaged the country from Ophoven to Kessenich. Last year the oaks were destroyed in the most remarkable manner. He suggests that the chrysalis should be rigorously killed, especially between July 15th and August 15th, before the imago can be developed. Also, that as at that time the moth lays little nests of eggs at the tops of trees, it should be destroyed before doing so. These ravages appear to be caused by a moth *Ocneria dispar*, which is not very common in England when compared with its abundance in central Europe. M. E. Lejeune contributes an article on "The Influence of Cold upon Plants."

## COUNTRY LORE

The Coming of Spring.—Far away from the bustle of town life, far too from the grimy smoke and yellow mist which shrouds our large cities, is a quiet, peaceful spot where the advent of spring is earlier and far more apparent than it can ever be in the neighbourhood of closely-crowded dwellings. This earthly paradise is but a strip of common land a few feet above the sea-level, yet here spring reveals herself with a delicacy and beauty which is well nigh indescribable. The sparkling waves roll lazily in and break into a line of white fluffy foam at one's feet. Above high-water mark there is sand, white, sun-dried sand, smoothed over by the breeze, or blown into little drifts wherever stones or heaps of dry seaweed bar the onward progress of the tiny particles. Almost imperceptibly the beach merges into a line of very low sand-hills clothed with a sparse growth of dry rushes and prickly-leaved plants. It is delightful to lie idly among these dunes, in a hollow in the sand, sheltered from the wind and warmed by the sun's rays. Thus resting, one may look out over the vast expanse of dancing water, with its rich variety of blues and greens and greys, and the dark patches marked by passing distant clouds. Nearer in shore are gulls, some flying and swimming about a sand-bank left dry by the falling tide. All is peaceful. No sound is audible, save the regular, never-ceasing break of the waves and the hoarse cries of the birds. Behind these sand-hills is the common, with soft, close, green turf under foot. Gorse bushes, covered with golden blossoms, are on every side, and the cloudless blue of the sky above. The silence seems almost oppressive now that the waves and the gulls are beyond hearing. The warm sunshine pours down upon the gorse flowers, and the whole air is charged with their fragrant perfume. The smell reminds one of peaches, yet, in reality, it is very different. Amongst the grass, great blue dog-violets nod gently to the passing breeze, and a huge, hairy, yellow-banded bee buzzes aimlessly by. Suddenly a lark springs up a few yards in front, and goes away up into the heavens, pouring forth its flood of song. The music is "as old as the hills," so to speak, yet it never palls. We have heard the same song many times before, yet we are always delighted to hear it again, and shall be until the end comes. Of how many songs of man's making could this be said? Yet, so it is with Nature; none of her ways ever become old to those who watch them with eyes tempered with love and reverence of her. Beyond the common the ground rises. On the slope is a coppice with underwood of two or three years' growth separated from the gorse by a wide ditch. The ground under the bushes is carpeted with primroses and wood anemones, whose stellate blossoms are seen through a network of brown twigs and branches. A tiny silvery trickle comes to the ear from where a red, moss-grown tile empties its sparkling shower into the ditch below. On the bank is a primrose plant remarkable for its size and beauty. All the flowers seem to be striving to catch a glimpse of the splashing water. There are numbers of them on this one plant, each with its five yellow petals ranged round the orange centre. This coppice will resound to the song of the nightingale ere many days have passed. They always come. Thousands of years ago the ancestors of these little brown birds came, probably to this very spot, and sang their wonderful song all through the sunny days and far into the moonlit nights. Then man was nothing but a half-naked savage, roaming the forests by day and sheltering in caves by night; but the nightingales came, built their nests of dead, brown leaves, reared their young, and carried out all those delightful little domestic duties which are ascribed to instinct just as cleverly and well as they did last year, and as they will this spring, in a week or so.—*Alfred H. Bastin, Ivy House, New Road, Reading; April*, 1897.

Australian Wool.—The introduction of Australian wool into England appears to have been due to a Quaker, Samuel Marsden, who went to Australia in 1808. He sent a quantity of Australian wool to one William Tompson. This was made into cloth, and as the material was so satisfactory two coats were made out of it—one for Samuel Marsden, who appeared in this coat before George III. The king was so pleased with its appearance that he ordered one for himself, and gave Mr. Marsden six merino sheep to improve the breed in Australia.

"Spiræa japonica."—The plant commonly sold potted for decorative purposes under this name, has no claim to it at all. It does not even belong to the same natural order as the true Spiræa. It bears a somewhat superficial general resemblance to them, and by anyone slightly acquainted with botany may easily be mistaken for a foreign species of the genus. A little careful examination, however, makes the differences obvious. There are two indigenous British members of the genus *Spiræa*, *S. filipendula* and *S. ulmaria*, the well-known beautifully-scented and graceful queen-of-the meadows, or meadow-sweet. These, like almost all the members of the great natural order Rosaceæ to which they belong, have "indefinite" stamens; that is twenty or more, while the pseudo-spiræa has ten only, a fact of itself sufficient to make one pause in considering its systematic position, and observe more carefully the pistil or central organ of the flower, upon which, chiefly, the final decision is founded. This, in the true *Spiræa*, is composed of "carpels five or more, free or connate below," seated on the open receptacle. In the first British species named they are straight, in *S. ulmaria* much twisted; in each case two ovules are present; fruit follicles, five or more. While in the other case there are two carpels only, united below into a two-celled ovary, separate above with terminal stigmas, ovules many, fruit a capsule. The ovary is sub-superior, *i.e.* the lower part adheres to the calyx tube, while the upper is free. These characteristics bring the plant into natural order Saxifragaceæ, which, though closely allied to the Rosaceæ, is still sufficiently distinct. Its correct name is *Astilbe japonica*.—*James Burton*, 9, *Agamemnon Road, West Hampstead.*

Nightingales.—These birds were in early song this season in several localities in southern Kent and Sussex, the soft, damp weather having been in favour of the production of their insectivorous food.

# NOTES & QUERIES

MOLLUSCA OF KENT.—As I am engaged in compiling a list of the Land and Freshwater Mollusca of Kent, I would ask any of the numerous readers of SCIENCE-GOSSIP to furnish me with the records of any of the rarer shells they may have found in the "Garden of England." Records are particularly wanted of *Vertigo* (all species), *Amalia gagates*, *Arion subfuscus*, *Hyalinia draparnaldi*, *Helix fusca*, *Buliminus montanus*, *Pupa secale*, *Acicula lineata*, *Dreissensia polymorpha*, *Sphærium ovalis*, *Viviparus contectus*, and *Planorbis glaber*.—*A. S. Kennard, Benenden, Mackenzie Road, Beckenham, Kent.*

ABNORMAL ORANGES.—The oranges to which your correspondents refer (*ante* page 307) are well-known and greatly esteemed in the United States, though until recently they have been but little used in Britain. They are a perfectly distinct fruit, properly known as the "Washington Navel." They are almost invariably seedless. These oranges are on sale in Britain, and are sometimes described as "Washington Naval" or simply as "Naval oranges." Of course, the incorrectness of this name is obvious when one realises that the derivation of the name "navel" is from the peculiarity noted by your correspondents.—*H. Snowden Ward, Farringdon Avenue, London, E.C.; April 6th*, 1897.

GREAT AUK'S EGG.—Mr. Stevens sold at his Auction Rooms in King Street, Covent Garden, on April 14th, another egg of the extinct great auk. It originally came out of the collection of Mr. Potts of Croydon, who had three specimens. Two of these were sold about 1853 in the same room as that on April 14th. One realised £29 and the other £30. The third was retained for many years afterwards by Mr. Potts, but eventually was acquired by Mr. Leopold Field, the well-known ornithologist. When the latter gentleman gave up his collection, this egg and the skin of a great auk were purchased by Mr. Rowland Ward of Piccadilly, who sold the skin to the Hon. Walter Rothschild for the Tring Museum, where we believe there are now two skins. The egg was sent to Mr. Stevens for sale in April, and reached the sum of two hundred and eighty guineas. It was purchased by Mr. Middlebrook, an enterprising public-house proprietor of Mornington Road, Regent's Park, London, who has attached to his premises a small show to attract customers. In this "free museum" is another great auk's egg which Mr. Middlebrook also purchased at the Stevens' Sale Rooms, some little time ago, for one hundred and sixty-five guineas. The specimen last sold by Mr. Stevens was well marked and in perfect order. It is the third which has recently been purchased in the same rooms, not for science's sake, but for "bold advertisement." It is not for us to complain how and when a purchase is made in a public auction room, but we cannot help feeling regret that one of these rare eggs has not gone to the national collection at South Kensington, where a good specimen is sadly needed.

REARING DRAGON-FLIES.—Mr. James G. Needham, of Ithaca, New York, who is engaged upon a popular monograph of North American dragon-flies, contributes to the April number of the "Canadian Entomologist" a paper on rearing these handsome insects. Having described how easy it is to collect the nymphs with the aid of a garden-rake to pull out the water-weeds to which the nymphs cling, or a water-net, Mr. Needham proceeds to say: "They are quite easily reared. I have found common wooden kits and pails half filled with water, with screen or netting covers, entirely satisfactory. A number of nymphs, if near one size, may be safely kept together, excepting a few notoriously cannibalistic Æschnina, and if not grown may be fed upon such small insects as a net will gather in any pond. A good square meal once a week will keep them thriving The water should be reasonably clean. Three things must be observed: (1) there must be a surface up which they can climb to transform; if the sides of the kit are too smooth put in some sticks; (2) there must be room enough between the netting cover and the water for complete expansion of their wings; (3) they must remain out of doors where sunshine will reach them. This last point is essential to success. There is still an easier way to do it, and one which, when a species is very common, will prove entirely satisfactory. . . . If one will go to the edge of the water it frequents at the time of its emergence, one may find nymphs crawling from the water, others transforming, imagoes drying their wings and others ready to fly, and thus may obtain in a few minutes the material necessary for determining nymphs and imago. The time of emergence may be determined by noticing at what time pale young imagoes are seen taking their first flight, and then going out a little earlier. The unfortunate thing about it is that many of the larger species transform very early in the morning, and to take such advantage of them one must be on the ground between daybreak and sunrise. Imagoes should be kept alive until they have assumed their natural colours. It is most important that each imago and its cast skin should be kept together. Eggs, also, are easily obtained. If the ovipositing female be captured, held by the fore-wings, leaving the hind-wings free, and dipped by hand on the surface of clean water in a vial or tumbler, an abundance of eggs will usually be liberated."

SOME NATIONAL ZOOLOGICAL GARDENS.—An interesting and comparative article upon the National Zoological Park at Washintgon, U.S.A., appears in the last Report of the Smithsonian Institution, under whose control it has been placed. The total acreage occupied by the Washington Zoological Gardens reaches about 167 acres, with ample supply of water for lakes, ponds and inclosures. It was acquired by national purchase about 1889, since which it has been laid out as a place for recreation of the citizens, as well as for their instruction. With regard to size, we understand, as becomes a national American institution, it is the greatest in the world, the comparison being, in acres, Washington, 167; London, 36; Paris, 17; Berlin, 60. With regard to the population of animals on exhibition, we believe London more than doubles that of any other. For picturesqueness Washington will doubtless take the palm, and its extent and airiness should contribute to the healthiness of the animals confined there.

# TRANSACTIONS

The South London Entomological and Natural History Society.—March 11th, Mr. R. Adkin, F.E.S., President, in the chair. Mr. Lucas exhibited living nymphs of the dragon-fly *Pyrrhosoma minium*, from Oxshott. Mr. Tutt, a pine-branch with a nest of a gregarious Europterid moth, sent from Cannes by Dr. Chapman; it was presumably that of *Cnethocampa pityocampa*. He then gave the results of a recent examination of the ova of *Tephrosia crepuscularia* (*bistortata*) and *T. biundularia*, illustrating his remarks with blackboard diagrams, from drawings made under the microscope that day. There were three distinct batches of ova: (1) of *T. crepuscularia*, (2) of *T. biundularia*, and (3) the result of a cross between the two species—a female of the former and a male of the latter. The shape and texture of the three batches were well differentiated. Those of *T. biundularia* were smaller, somewhat oval in shape, of a yellow colour, and more opaque; whilst those of *T. crepuscularia* were cylindrical with rounded ends, of a pearly-green, slightly transparent and iridescent. The ova which were the result of the cross were intermediate in size, slightly more rounded at one end than the other, and more variable *inter se* than either of the other batches, which were remarkably constant in their characters. He was indebted to Mr. Bacot for the opportunity of examining these batches side by side under the microscope. That gentleman had succeeded in breeding the species at the same time, and had forwarded him the ova on the same day as they were laid. He did not know whether each batch was the product of a single female or not. Mr. Tutt then referred to the alleged occurrence of *T. biundularia* in Morayshire, and said that the opinion of several members was that Mr. Adkins' specimen was only *T. crepuscularia*. Mr. Horne's specimen from the same district was now exhibited, and he, Mr. Tutt, said that it was identical with the Perthshire specimen, and of the same type as the Central European forms of *T. crepuscularia*. Mr. Montgomery, larvæ of *Mania maura*, which he had obtained from Mr. Young, of Rotherham. Mr. Adkin, specimens of *Abraxas grossulariata*, in one of which the yellow band extended across two-thirds of the hind-wing, and in the other the yellow colour was reduced in intensity to a very pale buff. He also showed an *Arctia caia*, with fore-wings much suffused with brown, and with the blue-black blotches of the hind-wings much run together. A long discussion then took place on the protection of insects in danger of extermination, and finally the following resolution was adopted: "That the thanks of the South London Entomological and Natural History Society be given to the Committee of the Entomological Society of London, for the protection of species of insects in danger of extermination; that the Society strongly approve of the work; and that the members present pledge themselves to use their personal efforts to further the objects of the Committee."—March 25th, Mr. R. Adkin, F.E.S., President, in the chair. B. H. Waters, Esq., 48, Finsbury Pavement, E.C., was elected a member. Mr. McArthur exhibited specimens of *Melanippe hastata* from various localities, and said that he had never taken the species in Shetland, nor had he seen the food-plant there. Rev. E. Tarbat, a gynandromorphous specimen of *Melanargia galatea*, taken at Swanage. The markings of the underside followed those of the upper. Mr. Mansbridge, a bred series of *Anchocelis rufina* from Huddersfield, which were less uniformly tinted than the southern examples of this species. Mr. Tutt, specimens of *Phigalia pedaria* (*pilosaria*) taken near Bradford by Mr. Butterfield, who reported the dark vars. as much more common this year than he had noticed before, and attributed the variation to scarcity of food, especially as the examples were small, thinly scaled, and badly pigmented. Mr. Mansbridge said the black was of a different kind to that of the melanic specimens he had seen from the West Riding of Yorkshire. Mr. Tutt reported that Mr. Clarke had taken *Tephrosia crepuscularia* this spring from the wood which Mrs. Bazett had asserted did not produce it, and so confirmed the statement made by Mr. Henderson last October. Rev. E. Tarbat also reported the species from woods near Reading. Mr. Turner, living larvæ of *Cleora lichenaria*, taken in Ashdown Forest, and remarked on their wonderful resemblance to the lichen, upon which they fed. He also made a few remarks on the district, in anticipation of the proposed visit of the Society at Whitsuntide. Mr. Adkin, series of *Abraxas grossulariata*, bred from Perthshire larvæ, including a noticeable var. with fore-wings having a broad white central band with a large circular black discoidal spot, and hind-wings also having a large discoidal spot. A paper, entitled "Representative Species," by Prof. A. Radcliffe Grote, A.M., was then read by Mr. Tutt. It showed, at some length, the identical and parallel species which existed in the two continents.—*Hy. J. Turner, Hon. Report. Sec.*

City of London Entomological and Natural History Society.—Tuesday, January 5th, 1897, the President in the chair. Mr. Rowland Brown was elected a member of the society. Exhibits: Mr. Oldham, eight dwarf *Cosmia trapezina*, taken in Epping Forest in 1895–96, in support of a theory that the species is getting small by degrees in the locality; also *Cosmia affinis* and one dwarf *Scopelosoma satellitia* from Woodford, and one *Scotosia certata* from Cambridgeshire. Mr. Burrows, a number of *Acherontia atropos*, including one from Rainham, in 1893, which had the inner band distinctly paler on the left hind-wing. He also read some notes on his rearing. Mr. Riches, larvæ of *Acidalia holosericata*, from ova laid on October 12th, and hatched on November 13th. Mr. Sauzé, *Rhinolophus liphoseridos* (the lesser horse-shoe bat) from Johannisbrid, Bohemia. Mr. Nicholson read a paper, entitled "Stars, Star Clusters, and Nebulæ."—February 2nd, Mr. F. J. Hanbury, Vice-President, in the chair. Dr. Dudley Wright, F.E.S., and Mr. H. E. Heasler were elected members of the Society. Exhibits: Mr. Bacot exhibited larvæ of *Bombyx spartii* and *B. quercus* from ova laid by south French parents received from Mr. Warburg, and larvæ of English *B. quercus* received from Mr. Goymour; also preserved larvæ of *Bombyx rubi*, *B. trifolii* and *B. castrensis* for comparison. He said that the difference between the *B. spartii* and French *B. quercus* was first apparent after the second moult, but was more marked after the third moult. It consisted of the different colour of the dorsal coat

of short hairs or fur. This in *B. spartii* was light red-brown, while in the *B. quercus* it was white. The larvæ of the English *B. quercus* differed markedly from both the South of France forms in the fourth or fifth skins. They seemed to be quite a moult behind the French races in getting their adult skins. The head was dark-blue or blue-black, while in the French examples it was usually reddish-brown with a white marking on the face that was generally absent in the English form, although a few of these larvæ had a dirty white marking on the face, which, however, differed in shape from that on the French larvæ. The hairs were also much more scanty in the English form, and the long hairs, which in the French races were white, were brown in the English larvæ. The white sub-dorsal line and the remnants of the oblique stripes were also stronger in the English forms, and there were traces in some larvæ, strongly developed, of a blue line or band just above the sub-dorsal line; probably a remnant of the blue stripes that are well developed in *B. trifolii* and *B. neustria* and slightly less so in *B. castrensis*. The English *B. quercus* Mr. Bacot took to be the older form, the French *B. quercus*, occasionally having faint traces of the blue, coming between it and *B. spartii*, which was more constant and tended to approach *B. rubi* in the loss of these markings. Mr. Warburg had also very kindly given Mr. Bacot a few larvæ, the result of a pairing between a male *B. quercus* (French) and a female *B. spartii*. These larvæ were now in about the fourth stage; four of them had the white *B. quercus* coat, six the red-coloured fur of *B. spartii*. Mr. Bacot also said that he had placed some larvæ of *Orgyia gonostigma*, which had passed the usual hibernating stage, before the food-supply failed, in a cold room, to see if they would hibernate. They attempted to do, fastening themselves in one position, which they occupied through October, November and most of December. But they subsequently died, being unable, apparently, to stand the winter's cold, which had had no ill effects on larvæ hibernating in their normal stage. Mr. Dadd exhibited *Catocala fraxini* from Germany, *C. nupta* from Wood Green, *C. sponsa* and *C. promissa* from the New Forest, and *C. pacta*, *C. luciana* and *C. concumbens* from Dakota, U.S.A. Mr. Riches exhibited a specimen of *Phrynsoma cornutus*, on which he read the following notes: "This creature is a native of California, and is known as the horned toad; it is quite harmless, and when captured does not attempt to kill or bite; and not having a protrusive tongue, like the chameleon, and being slow, it is only able to catch slow insects, such as the sand-beetles, upon which it feeds during the evening. In the daytime it lies passive on the sand. A reputed peculiarity of this lizard is its habit of ejecting jets of blood from its eyes, apparently as a means of defence."—*Lawrence J. Tremayne, Hon. Sec.*

Hull Scientific and Field Naturalists' Club.—The usual fortnightly meeting was held on March 17th, Mr. Paul Davis in the chair. Mr. Knight referred to a recent botanical excursion he had made, and exhibited some of the specimens he had collected. He also handed round some fresh examples of that peculiar Alpine plant, *Sedum monstrosum*. It was reported that a badger had recently been caught at Brandsburton—a very rare occurrence in the Hull district. Mr. F. W. Fierke, M.C.S., then proceeded to give his paper on "A Tour in Switzerland." Mr. Fierke graphically described a journey taken by himself and another member of the Club, Mr. J. Burns, to the "Lower Alps," last summer. Extensive collections were made, principally of plants and entomological specimens; the "large black salamander," and a quantity of land-shells were also obtained. Mr. Fierke illustrated his remarks by a series of lantern-slides showing views of his collecting-grounds in Switzerland, and also of other places visited. A selection from the collection of plants, and also some butterflies, were handed round. The paper was followed by a lengthy discussion, in which several members took part.—The concluding meeting for the winter session was held on March 31st. The President, Dr. J. Hollingworth, M.R.C.S., occupied the chair. Several reports were given of excursions made in the neighbourhood during the previous fortnight. The secretary exhibited, on behalf of Mr. Mosey, a small earthenware flask, or water-bottle, which had been dredged up from the bed of the Baltic Sea by a fishing-smack. The specimen was encrusted with barnacles, surpulæ, and other marine organisms. A fine collection of butterflies, beetles, etc., sent over from South Africa by Mr. Russell, was handed round. Mr. F. W. Fierke, M.C.S., read an interesting report of an excursion he had made to Filey Brig on March 20th. On this date, the tides being unusually low, exceptional opportunities were given for investigation of the various interesting examples of marine life which abound on that part of our coast. The outing proved in every way satisfactory, and several specimens were found which had not previously been recorded for that locality. Mr. Fierke handed round his most important captures. The Rev. C. A. Hall read a paper on "The Origin of Language." The lecturer explained that all conclusions as to the origin of language must necessarily be inferences from known facts as to the nature of man and those conditions of life which call his faculties into play. Writing is of comparatively recent invention, and we can therefore only go back with precision in our analysis of words a few thousand years, and judge of many ages of slow progress by inference from such records as we have. The lecturer showed how the origin of writing started with rude depictions of objects from nature, and how these gradually evolved into alphabetic characters such as we see now used. Numerous examples of Chinese and Hebrew characters were given in explanation of this. The reverend gentleman concluded by stating that the origin of language was due to a desire on the part of the primitive races to communicate with each other. In course of time it was found that the simplest and most effectual way of exchanging ideas was by uttering sounds and exclamations, and though these necessarily would be of a very primitive character, they only required time to evolve into the various languages that we find to-day, though in the lecturer's opinion not one out of the 750 languages now existing is anything like perfect yet. It is difficult to say whether a really perfect language will ever exist. A lengthy discussion followed the lecture. At the close of the meeting, Mr. J. F. Robinson, a Vice-President of the Club, called attention to the fact that the past session had been the most successful in the history of the society. The lectures had been of a first-class character, most of the principal persons of the town interested in science being amongst the lecturers. The attendances had also been far better than those of previous years, and there is every prospect of future sessions being still more attractive.—*T. Sheppard, Hon. Sec.*, 78, *Sherburn Street, Hull.*

## NOTICES OF SOCIETIES.

THE GEOLOGISTS' ASSOCIATION OF LONDON.

*Excursions and Conductors.*

May 1.—Cookham. Paddington Station, 1.40 p.m. Ll. Treacher, F G.S.
,, 8.—Whole day. Southborough and Tunbridge Wells (Kent). G. Abbott, M.R.C.S. Charing Cross, 9 22 train.
,, 15.—Chislehurst (Kent). W. Whitaker, F.R.S., and T. V. Holmes, F.G.S. Charing Cross, 1.35 train.
,, 22.—Erith (Kent). Flaxman C. J. Spurrell, F.G.S.
June 5 to 8.—Whitsuntide. Cheltenham (Gloucestershire). E. Wethered. F.G.S., and S. S. Buckman, F.G.S.
,, 19.—Whole day. Leighton (Bedfordshire). A. C. G. Cameron.
,, 26.—Merstham (Surrey). G. J. Hinde, Ph.D., F.R.S., and W. Whitaker, F.R.S.
July 3.—Woking. F. Meesom.
,, 10.—Whole day. Peterborough (Northamptonshire). A. N. Leeds, F.G.S., and A. S. Woodward, F.G.S.
,, 17.—Bishop's Stortford (Herts.). Rev. Dr. Irving, F.G.S.
,, 26 to 31.—Long Excursion. Edinburgh. Prof. James Geikie, LL D., D.C.L., F.R.S.; J. G. Goodchild, F.G.S., and H. W. Monckton, F.G.S.

For particulars of these excursions, apply to Horace W. Monckton, Esq., Secretary for Excursions, 10, King's Bench Walk, Temple, E.C.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

April 27.—Exhibition. *Ante* page 312.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.

May 13.—Paper: "Autumnal Notes from Lake Erie." Professor A. R. Grote, M.A.
,, 29.—Field Meeting at Chalfort Road.
June 5-7.—Field Meeting: Ashdown Forest (Members intending to go please write to Secretary, Mr. H. J. Turner, 13. Drakefield Road, S.E.)
July 3.—Reigate.

NORTH LONDON NATURAL HISTORY SOCIETY.—The following are amongst the fixtures for next session:

May 13.—"My trip to Highcliffe, and what I found in the Barton Beds." J. Burman Rosevear, M.C.S.
,, 15.—Whole-day Excursion to Brentwood.
,, 27.—"Dorsetshire Notes." J. Wheeler, M.C.P.
June 4-7.—Excursion to the New Forest.
,, 10.—Debate: "Is Vivisection Justifiable?"
,, 19.—Half-day Excursion to the Lea Valley.
,, 24.—"Clothes-Moths." J. B. Casserley.

There will also be a special-family discussion, entitled "The Liparidæ," to be opened by A. Bacot on some date not yet fixed.—*Lawrence J. Tremayne, Hon. Secretary.*

LAMBETH FIELD CLUB AND SCIENTIFIC SOCIETY.—We have received the following list of fixtures for the forthcoming session:

May 3.—"Some of our Smaller Song-birds." E. W. Harvey-Piper.
,, 8.—Outing to Sanderstead (with Selborne Society).
,, 22.—Visit to Kew Gardens.
June 7.—Whit-Monday.—Outing to Cheshunt.
,, 19.—Outing to Caterham. *H. Wilson, Hon. Sec., 14, Melbourne Square, Brixton Road.*

HULL SCIENTIFIC AND FIELD NATURALISTS' CLUB.

*Excursions.*

May 8.—Swine. Paragon Station 2.5 p.m. Return fare 1s.
,, 13.—Yorkshire Naturalists' Union at Skelmanthorpe.
,, 15.—Twigmoor Gullery.
,, 29.—Barton and South Ferriby. Boat from Corporation Pier at 1.40 p.m. Return fare 1s.
June 7.—Goole Moor.
,, 12.—Aldbro.
,, 26.—Pelham Woods.

*Meetings.*

April 28.—Discussion: "Is Colour an Accident in Nature?" Opened by Mr. G. Ross.
May 12.—"Spring Flowers." Mr. J. F. Robinson.
,, 26.—"Maps." Mr. Paul Davis.
June 9.—"The Extinct Animals of Holderness." Mr. T. Sheppard.
,, 23.—"Crabs." Mr. F. W. Fierke, M.C.S.

For particulars, apply to Mr. T. Sheppard, Hon. Sec., 78, Sherburn Street, Hull.

LEICESTER LITERARY AND PHILOSOPHICAL SOCIETY.

May 26.—"Parthenogenesis as it affects Insects." F. Bouskell, F.E.S.
June 5 to 9.—Excursion.
,, 23.—"Notes on Arancidæ (Spiders) of Leicestershire."

NOTTINGHAM NATURAL SCIENCE RAMBLING CLUB

*Geological Section.*—Leader, Mr. J. Shipman, F.G.S.

May 1.—Lenton and Radford. Meet at Water Fountain, 2.40 p.m.
,, 29.—Trowell, Strelley, Kimberley, etc. Meet Midland Station, 2.30. p.m.
June 26.—Drive to East Leake. Meet front University College, 2.30 p m. Fare, including drive, 24 miles, and tea, 2s. 6*d.*
July 10.—Trowell, Stony Cloud and Sandiacre. Meet Midland Station, 2.30 p.m.
Aug. 28.—Annual Excursion. Lincoln. Fare (special train), 1s. 6*d.*
Sept. 11.—Hucknall Torkard and Long Hills. Meet Midland Station, 1.30 p. m.

*Botanical Section.*—Leader, Mr. W. Stafford.

May 15.—Hucknall Torkard. Meet Midland Station, 3 p.m. Fare, 1s.; tea, 9d.
June 19.—Lambley Dumbles. Meet G.N.R. Station, 2.40
July 24.—Red Hill and Bestwood. Meet opposite Mechanics' Hall, 2 30 p.m.
Aug. 14.—Nottingham Arboretum. Meet Waverley Street Entrance, 2.30 p.m.
Sep. 18.—Radcliffe and environs. Meet G.N.R. Station, 1.45 p.m.
Oct. 16.—Annual Meeting, Rambling Club, Natural Science Laboratory, University College, Nottingham, 4 p.m. Tea, soirée and exhibition of collections made during season. *W. Bickerton, Hon. Sec., 187, Noel Street, Nottingham.*

## NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—SCIENCE-GOSSIP is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

NOTICE.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names Scientific names and names of places to be written in round hand

THE Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

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THE Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid.* Duplicates only to be sent, which will not be returned. The specimens must have identifying numbers attached, together with locality, date and particulars of capture.

ALL editorial communications, books or instruments for review, specimens for identification, etc., to be addressed to JOHN T. CARRINGTON, 1, Northumberland Avenue, London, W.C.

### EXCHANGES.

NOTICE.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

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FINE photo-micrographs, diatoms, spicules. sections, etc.; exchange for good micro-slides, unmounted objects, desmids, etc.—G. E. Carter, 4. Victoria Terrace, Dartmouth.

A FEW examples of Petricola pholadiformis, Lamk., from Herne Bay; desiderata, other rare British shells.—A. S. Kennard, Benenden, Mackenzie Road, Beckenham.

FOREIGN marine shells or dried New Zealand ferns exchanged for marine shells, Australian Chitons (preserved in formalin) for foreign Chitons, dried or in spirit.—L. Shackleford, 14, Edna Street, Crumpsall, Manchester.

WANTED, live box or turntable in exchange for slides; will send list upon receipt of description of either of above.—A. Nicholson, 5, Danesbury Terrace, Darlington.

WANTED, during the season, Sinapis, larvæ of Cratægi and pupæ of Rhamni. Exchange Fuliginosa, Trifolii, Silago, Chi with dark variety, etc.; exchange lists desired.—J. Nicholson, 65, Hartington Street, Newcastle.